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NPIC/R-1405/63

August 1963

PHOTOGRAPHIC INTERPRETATION REPORT



INDUSTRIAL COMPLEX, PAO-TOU, CHINA



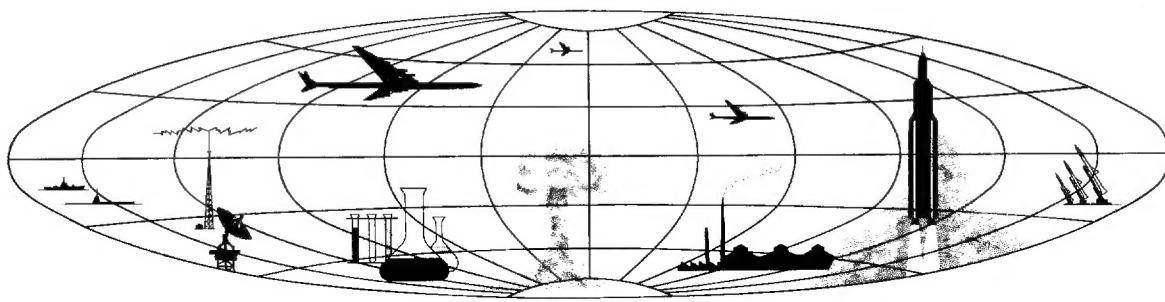
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INTRODUCTION

The city of Pao-tou, China, is the hub of a large and heterogeneous industrial complex (Figure 1). The center of the complex is located at 40-40N 109-55E, on the north bank of the Huang Ho (Yellow River) in Inner Mongolia and 350 nautical miles (nm) west-northwest of Peiping. A comparison of World War II photography with that of [redacted] [redacted], on which this report is based, reveals that this complex has been greatly developed since

1945 (Figure 2). The dearth of aerial photography covering the complex renders it difficult to determine the status of construction or to estimate the operational status of those facilities which appear to be near completion.

The selection of industries for analysis was governed by the industries' apparent overall importance to the complex. Small industrial plants, construction materials plants, and storage areas have not been analyzed. Figure 43

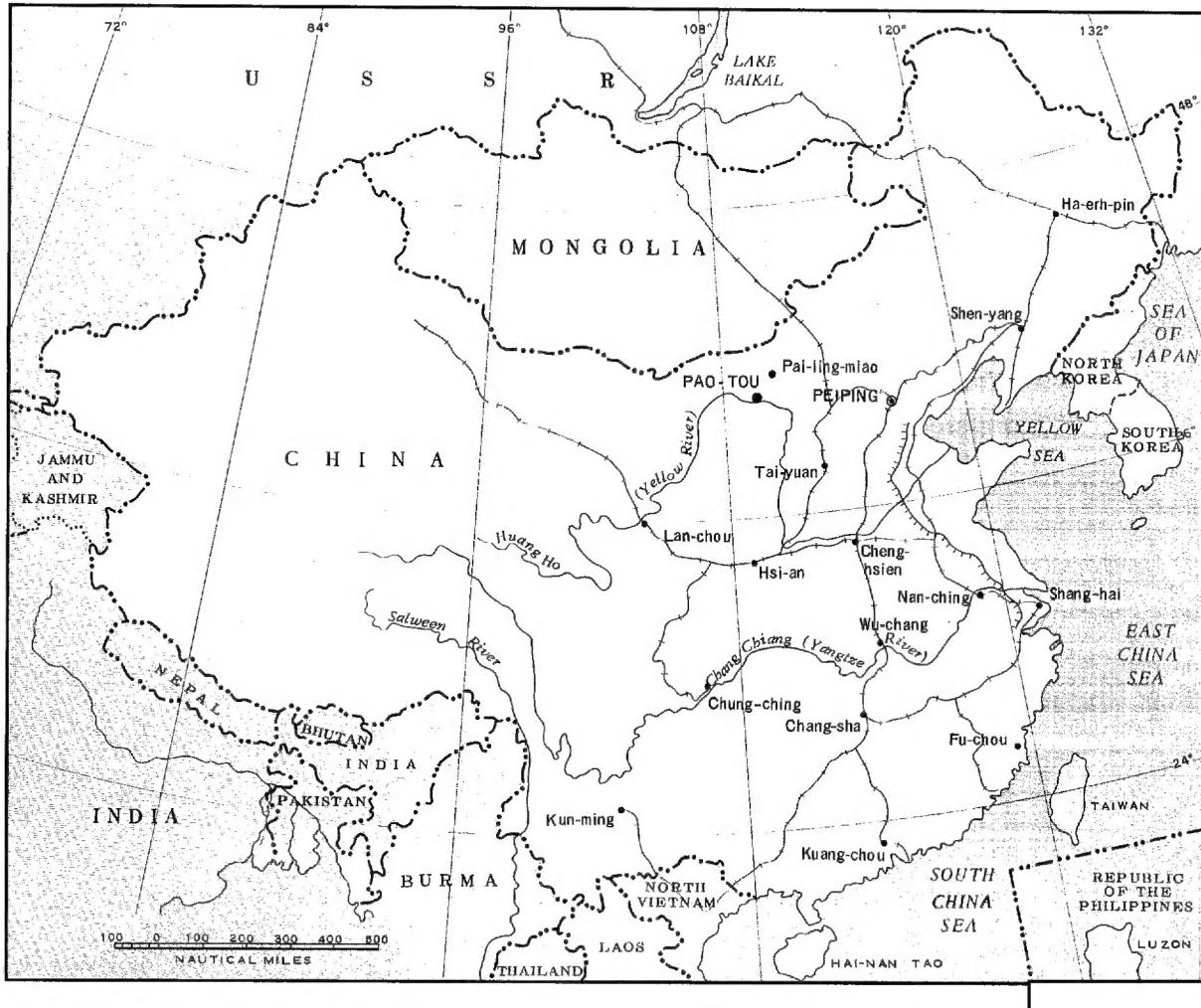


FIGURE 1. LOCATION OF PAO-TOU, CHINA.

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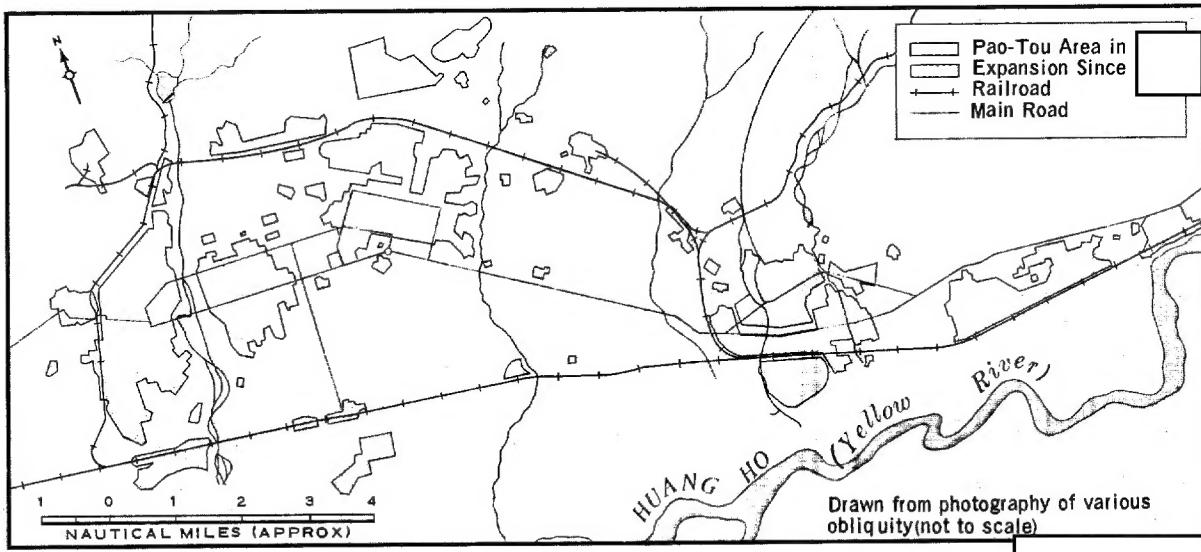


FIGURE 2. EXPANSION OF BUILT-UP AREAS AT PAO-TOU SINCE 1945.

shows the locations of major industries. Individual facilities within the complex are located by direction and distance from a reference point. This reference point is at the intersection of two imaginary lines, one drawn through the middle of the airfield runway (long axis) and the other drawn through the center

of the north taxiway (long axis). The current Bombing Encyclopedia (BE) designation and identification number have been provided whenever they are available for a specific industry or installation in the complex. All photography, unless otherwise specified, is that of

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(40-40N 109-45E; [REDACTED], Ping-li-she-cheng Iron and Steel Plant)

A coke, iron, and steel combine (Figure 3) is located 14 nm northwest of the reference point. This is a highly mechanized and integrated industrial combine which occupies an area 5 nm square and contains modern facilities for ore concentration, coke and coke by-products, as well as blast furnaces, open-hearth furnaces, and rolling mills. Although many of the facilities are still under construction, most appeared to be in operation on photography of [REDACTED]

The combine appears to be well situated in proximity to coal and iron ore deposits; iron ore is mined at Pai-ling-miao, located 80 nm to the north, and is shipped to the coke, iron, and

steel combine. Coal is mined approximately 25 nm to the east.

Several small industrial installations are also located within this area. Other facilities include small iron smelters, some of which are briefly described and illustrated in this section (Figures 12 and 13).

ORE CONCENTRATION PLANT

(40-39N 109-44E)

An ore concentration plant (Figure 4) is located 13.8 nm northwest of the reference point. An unloading building has two through tracks for standard-gauge railroad cars. Two

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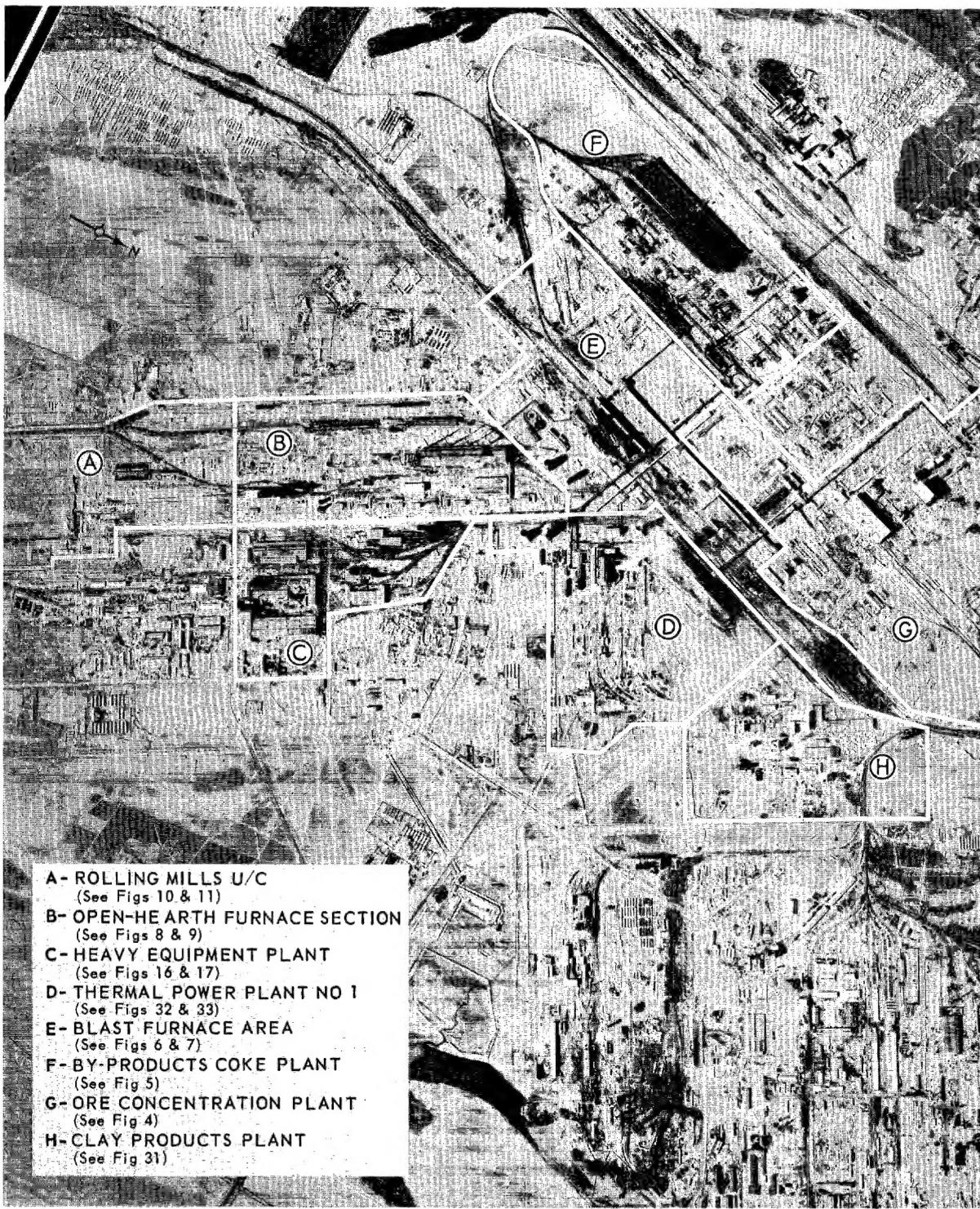


FIGURE 3. COKE, IRON, AND STEEL COMBINE.

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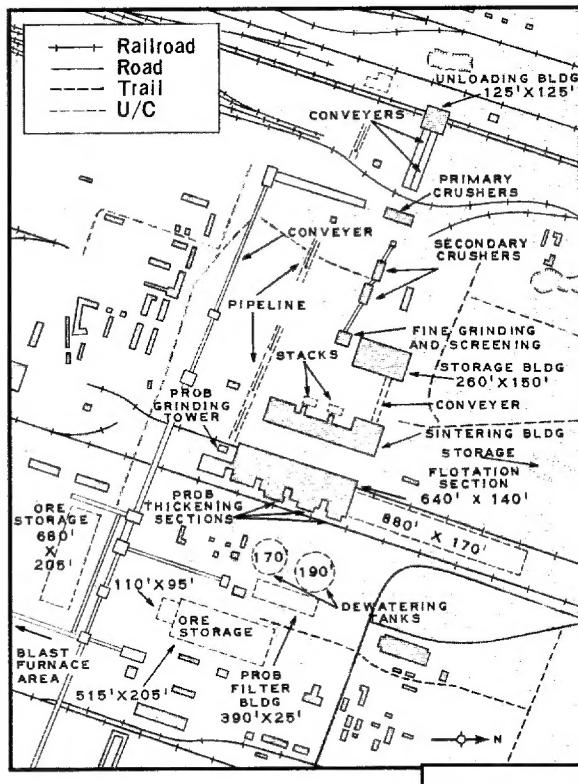


FIGURE 4. DETAIL OF ORE CONCENTRATION PLANT.

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underground conveyors, still visible, will carry the ore to the primary crushers, then to the secondary crushers, and finally to the fine grinding, screening, and storage facilities.

The next conveyer in line connects the storage building with the sintering building. Foundations for two stacks are alongside the sintering building. Construction has not progressed sufficiently for the number of kilns to be determined. From these kilns the ore will go through a probable grinding tower and into a flotation section.

Three irregularly shaped structures attached to the east side of the flotation section are probably thickening sections. Two dewatering tanks for tailings are under construction. A pipeline under construction to the southwest will either supply water to the plant

or carry the tailings away.

A probable filter building and two ore storage buildings are also under construction. One of the ore storage buildings will have conveyers to a tipple for loading the concentrated ore into railroad cars, and the larger storage building will have conveyers to the covered stock trestle at the blast furnaces.

BY-PRODUCTS COKE PLANT

(40-39N 109-44E)

The by-products coke plant (Figure 5) is located in the coke, iron, and steel combine, approximately 13.5 nm west-northwest of the reference point. The plant consists of three coke oven batteries (300 by 65 feet, 245 by 55 feet, and 285 by 50 feet) with associated coaling towers and conveyers, a coalyard, a coal-pro-

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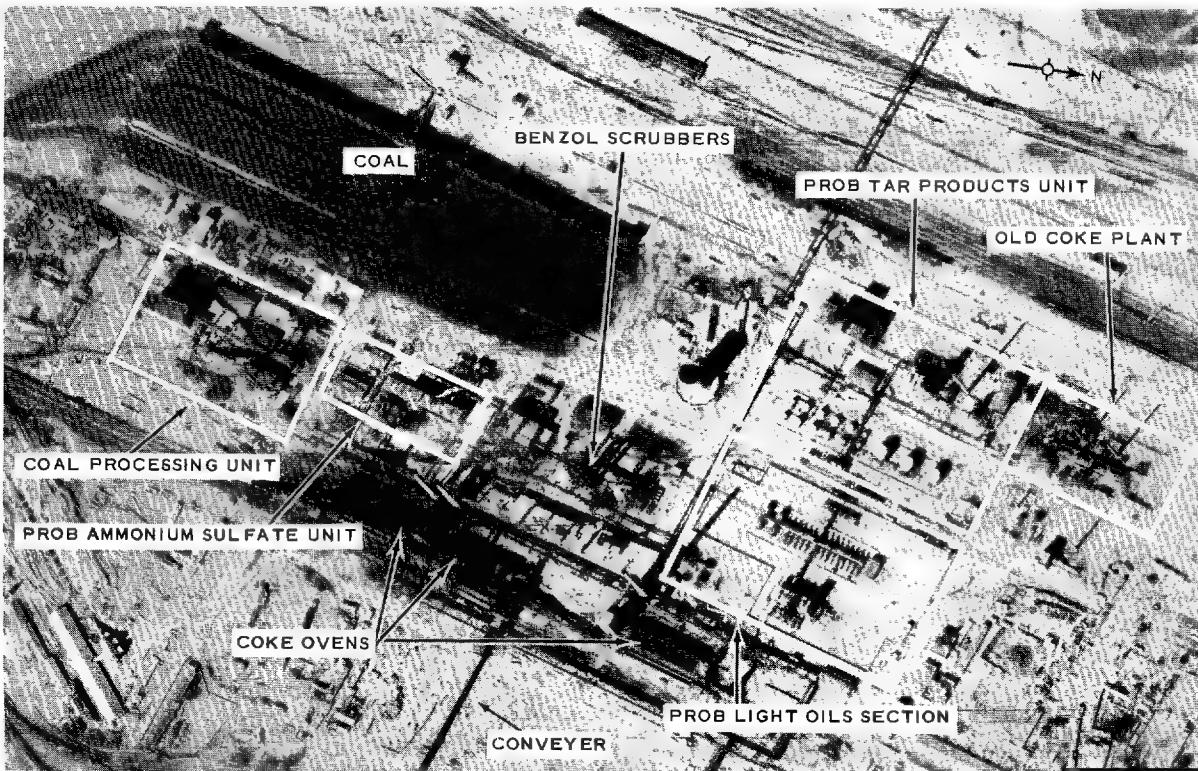


FIGURE 5. DETAIL OF BY-PRODUCTS COKE PLANT.

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cessing section, and a by-products section. The three batteries have a total of about 240 coke ovens.

The plant is complete and operational. Space is available for expansion, but no indications of new construction are perceptible. Smoke from the southern stack indicates that one battery of coke ovens is functioning and the emission of steam throughout the by-products section indicates that it also is in operation. Underground conveyers carry coal from the storage yard to the processing area. Overhead conveyers carry processed coal to the coaling towers and coke from the ovens to the covered stock trestle at the blast furnaces.

The by-products section is of modern design and is probably capable of complete refining of all by-products. The section includes an ammonium sulfate unit, benzol scrubbers, a

middle oils processing unit, a light oils processing unit, a tar products unit, and storage and rail-loading facilities.

An old coke plant having approximately 70 very small ovens in the north-central section of the plant area was inactive at the time of photography; however, it is connected to the other facilities by a pipeline and could be used if needed.

BLAST FURNACE SECTION

(40-39N 109-44E)

The blast furnace section (Figure 6) of the coke, iron, and steel combine is located 13.5 nm northeast of the reference point. It contains two complete, modern, operating blast furnace units.

Each blast furnace has a skip hoist, three hot stoves, downcomer pipes, dust catchers, and scrubbers. Conveyers carry the raw materials

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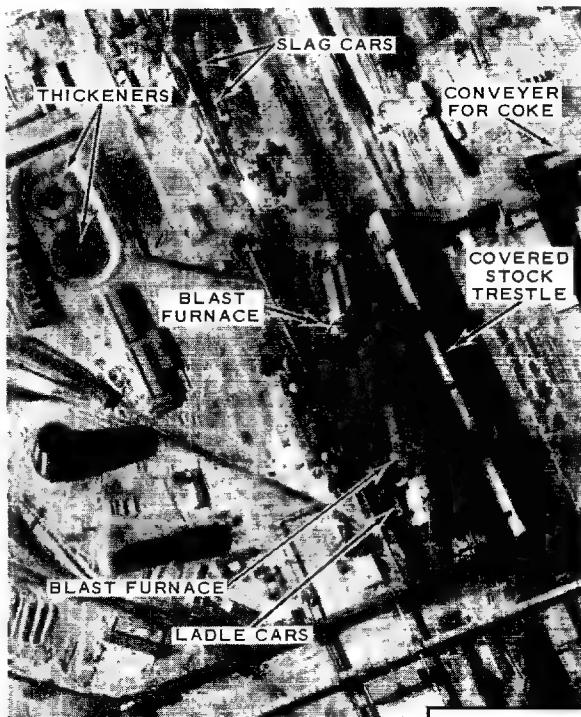


FIGURE 6. DETAIL OF BLAST FURNACE SECTION.

to the blast furnace area. There are no provisions for stockpiling large quantities of raw materials which are stored in the covered stock trestle just prior to use. The pig iron and slag are removed from the blast furnaces in ladle cars and slag cars, respectively. The pig iron is delivered to the open-hearth furnace building or cast into pigs and shipped out. The slag goes directly to the slag dump which is shown in the photomosaic of the Pao-tou industrial complex (Figure 44). A ground photograph (Figure 7) shows the principal parts of one of the blast furnace units.

OPEN-HEARTH FURNACE SECTION (40-39N 109-45E)

The open-hearth furnace section (Figures 8 and 9) of the coke, iron, and steel combine is located 12 nm west-northwest of the reference point.

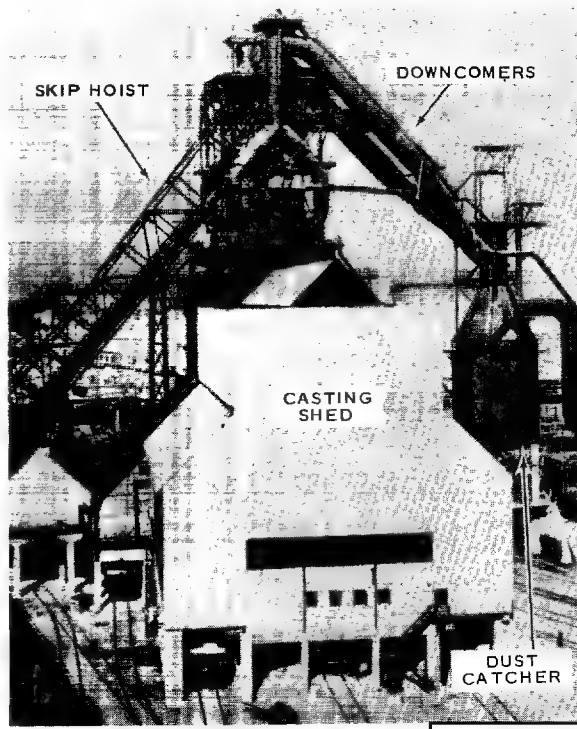


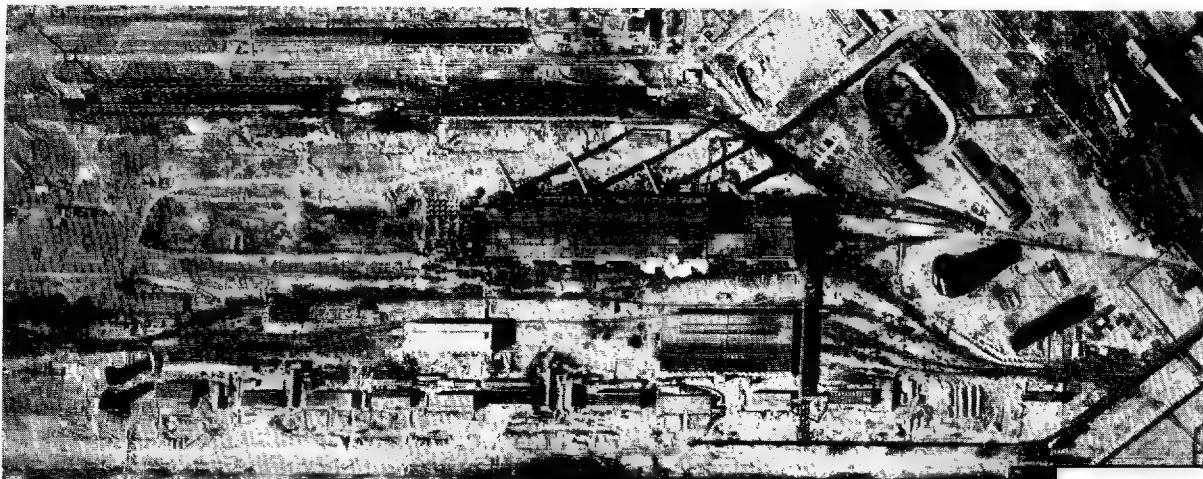
FIGURE 7. GROUND PHOTO OF BLAST FURNACE, LOOKING NORTHEAST AT BLAST FURNACE SECTION SHOWN IN FIGURE 6.

The size of the open-hearth furnace building is 800 by 215 feet; the spacing of the three stacks is 255 feet center to center and 270 feet center to center; and the height of these stacks is 255, 315, and 400 feet. It appears that each stack serves two open-hearth furnaces. If this is true the building currently contains adequate space for five furnaces. Smoke from the north stack indicates that at least one open-hearth furnace is in operation.

An extension, 180 feet in length, is being added to the furnace building and an excavation has begun on a foundation 800 feet in length. All construction activity has apparently temporarily ceased, although a tall cantilever crane is still in place next to the furnace building. Facilities other than the open-hearth furnace building include a scrap-storage yard, equipped with a

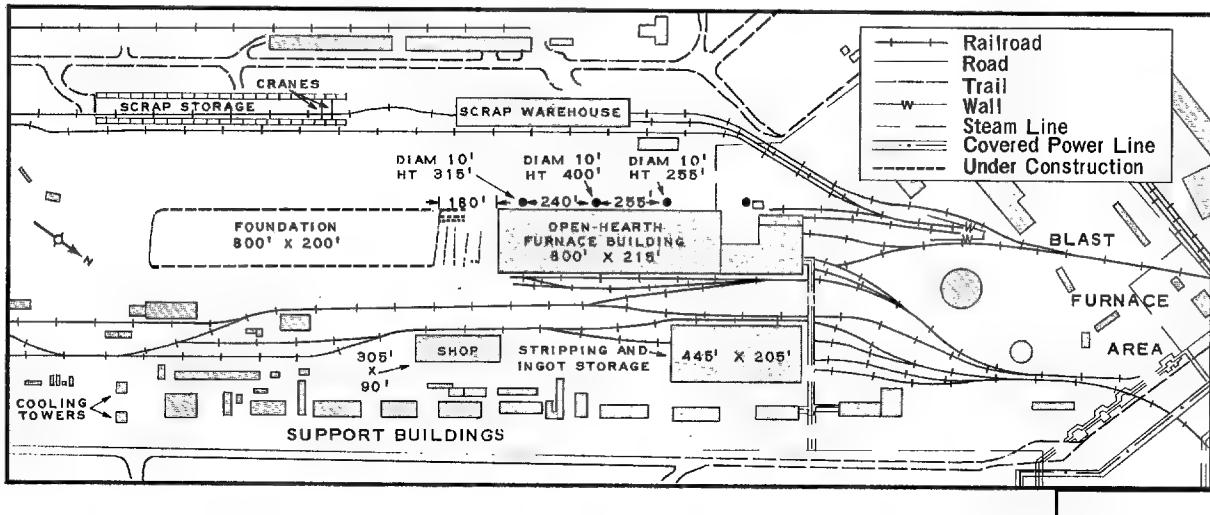
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FIGURE 8. OPEN-HEARTH FURNACE SECTION.



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FIGURE 9. LAYOUT OF OPEN-HEARTH FURNACE SECTION.

bridge crane, a scrap warehouse, a stripping and ingot storage building (445 by 205 feet), a large shop (305 by 90 feet), a water tower, and numerous support buildings.

ROLLING MILLS (UNDER CONSTRUCTION) (40-38N 109-46E)

Rolling mills (Figures 10 and 11) are located 13.5 nm west-northwest of the reference point. This section of the coke, iron, and steel combine is in the early stages of construction. Excava-

tions for foundations have progressed sufficiently to enable an approximate determination to be made of the sizes and outlines of the facilities under construction.

These facilities will consist of a soaking pit section served by six stacks, an adjacent bloom-ing mill, and a rolling mill. The rolling mill will be at least 785 feet wide and possibly as much as 1,110 feet wide. The length of this rolling mill cannot be determined, because excavation for the foundation has not been completed.

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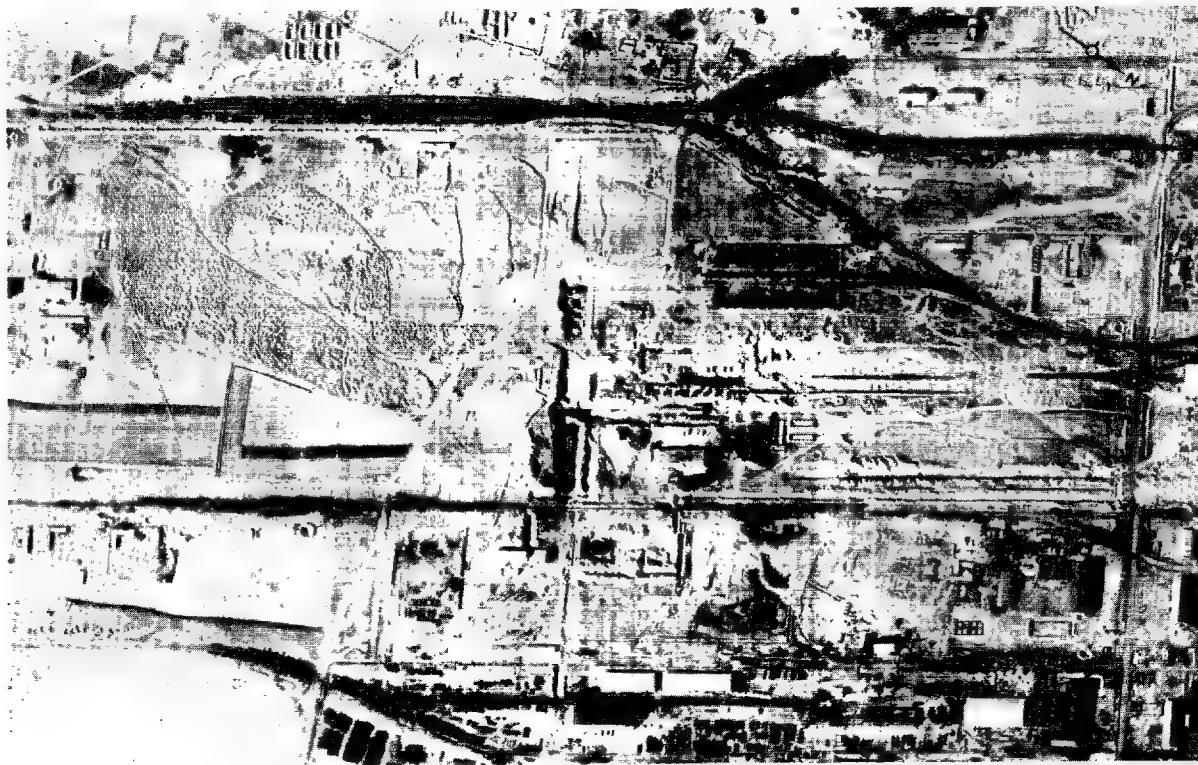


FIGURE 10. ROLLING MILLS.

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Construction activity in the area of the rolling mills has ceased. A double transmission line and a substation to serve these rolling mills have been installed.

SMALL IRON AND STEEL PLANTS

At least nine small iron and steel plants are located within the Pao-tou industrial complex. Only a few of these plants have open-hearth furnaces and coke oven batteries. The facilities at these plants are small in comparison with those normally found at industrial plants of this nature, and they have a low production capability. Furthermore, the coke facilities do not utilize waste gases as a source of valuable by-products.

The locations of these nine plants are as follows:

Distance/Direction From Reference Point	Geographic Coordinates
18 nm NW	40-41N 109-46E
12.8 nm NW	40-40N 109-46E
12.5 nm NW	40-39N 109-46E
9.6 nm NW	40-41N 109-53E
8.2 nm NW	40-40N 109-54E
3.6 nm NW	40-35N 109-56E
1.8 nm ENE	40-33N 110-01E
1.8 nm E	40-33N 110-02E
2.1 nm E	40-33N 110-02E

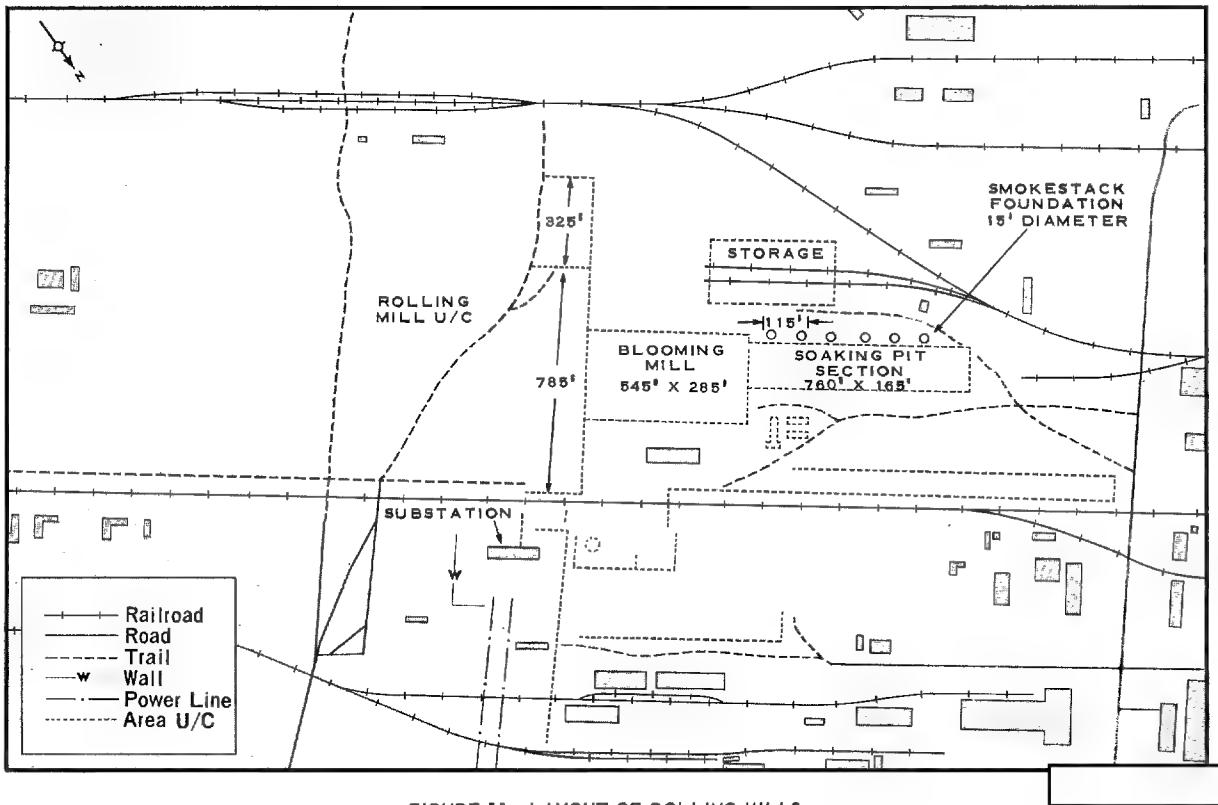
There are 37 blast furnaces (4 with vertical hot stoves), 3 probable Bessemer converters, 2 probable open-hearth buildings, 2 possible rolling mill buildings, and 9 coke oven batteries located at these nine facilities.

These plants vary considerably in size and production capability. The smallest consists of

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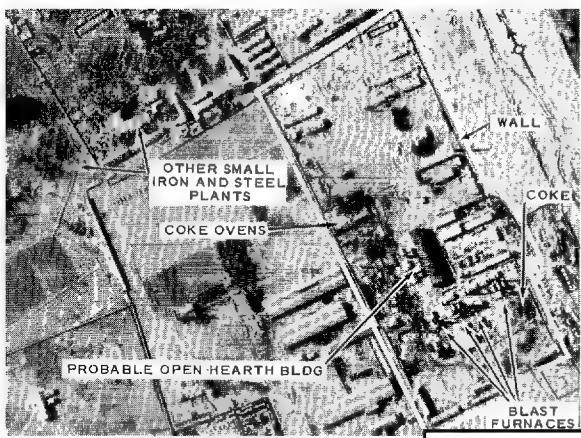
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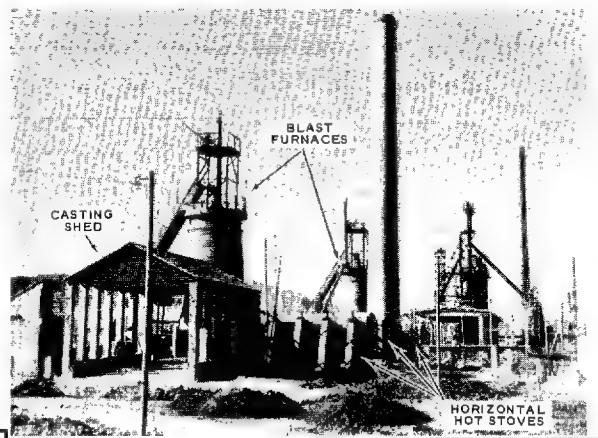
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a single uncompleted blast furnace as compared with the largest which has nine completed blast furnaces, a building containing three probable

Bessemer converters, and two possible small rolling mills. All of the plants appear to be relatively new. Differing amounts of ore and



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coal storage and of slag dumps indicate that most of the plants have been in production at some time in the past; however, no production activity at these plants is discernible on photography of [redacted]

All nine of the plants have many features in common; therefore, a detailed description of only one plant is presented here. This plant is located 1.3 nm east-northeast of the reference point. It is in the southeastern portion of the industrial area which contains three similar but separately

fenced plants (Figure 12). The plant, which is enclosed by a high board fence or wall, contains four small blast furnaces with horizontal hot stoves and associated sheds, one probable open-hearth building, and one coke oven battery (Figures 12 and 13). Rows of material, probably ingots or small castings, are in an open storage area associated with the probable open-hearth building. Moderate amounts of ore and coal are stored in the open within the fenced area, a practice common at all the plants.

MINING AREAS

Several mining areas are located within a 25-nm radius of Pao-tou. Extensive exploratory trenches and drilling scars are visible over large areas. To illustrate the type of mining and the

extent of some of the mining activity observed, two areas have been selected for inclusion in this study. One is a probable iron ore mine located close to the coke, iron, and steel combine;

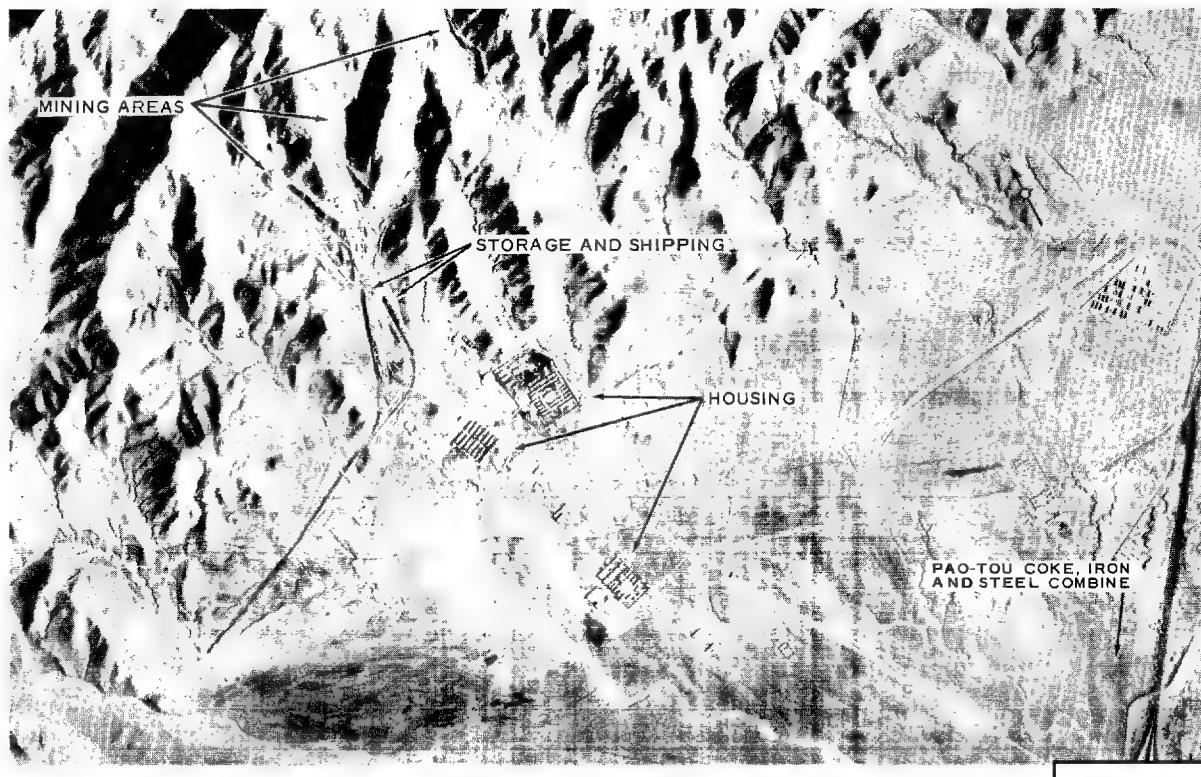


FIGURE 14. MOSAIC OF PROBABLE IRON ORE MINE.

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the other is a coal mining area located east of the city of Pao-tou.

PROBABLE IRON ORE MINE

(40-42N 109-45E)

A probable iron ore mine (Figure 14) is located approximately 14 nm northwest of the reference point, 2 nm north of the coke, iron, and steel combine. This mine appears to be relatively new, since the waste dump and the two open pits are small. The mine was very active at the time of photography. The proximity of this mine to Pao-tou is very significant because, currently, iron ore is hauled from an area near Pai-ling-miao, located about 80 nm north of Pao-tou.

The mine consists of two quarry-like open pits. No power shovels, bulldozers, or other heavy earth-moving equipment were visible. One

hoist house has been installed to handle ore cars between the open pit and the loading spurs.

The mining procedure appears to be very simple. After blasting is completed at the open face of the mine, the loose ore is loaded by hand into small ore cars which are pushed manually to the hoist house where they are lowered and the ore is dumped into hoppers above and parallel to the loading spurs. Several rail cars can be loaded at one time by force of gravity at each of two loading spurs.

Waste material or overburden is dumped to one side of the mine or is handled through a series of chutes and reloading points and is finally loaded into rail cars at the loading spurs. This waste material could be used locally as fill in rail and road construction and as aggregate for concrete.

Another mine, just to the north, is being

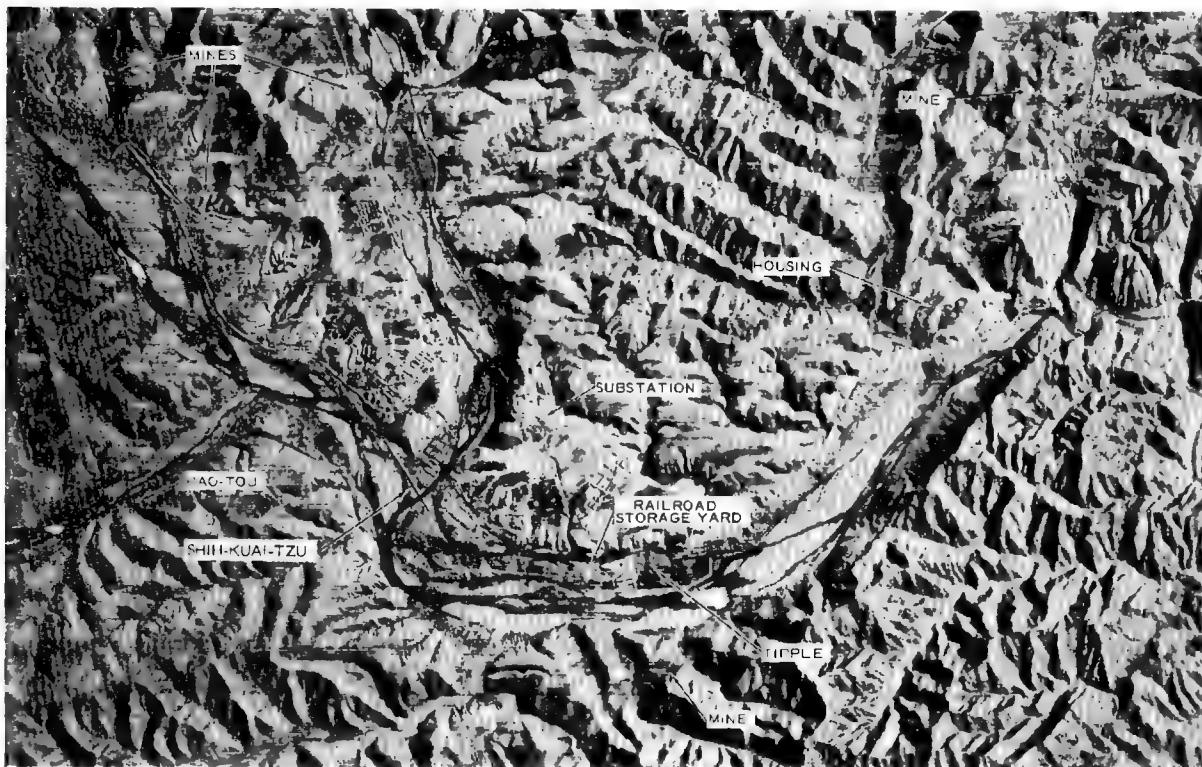


FIGURE 15. COAL MINING AREA.

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developed. The exact method of mining could not be determined; however, it probably is by the open-pit method. The ore is hauled in at a level above the access road and dumped at two or three points from which it is loaded by hand into dump trucks and hauled out. Eight large dump trucks were observed. A road- and rail-served housing area for the miners is located south of the mining areas.

COAL MINING AREA

(40-40N 110-15E)

A coal mining area (Figure 15) is located in the foothills of the Ta-ching Shan (mountains),

approximately 15 nm northeast of the reference point. The area is served by a highway and a rail spur which branches from the main lines just north of the city of Pao-tou.

Numerous shaft-type mines are scattered throughout an area 10 nm square. Each mine has a small housing and support section which is road and/or rail served. The main coal preparation and shipment areas are located at the town of Shih-kuai-tzu. These areas contain a large rail-served storage yard, other storage areas, tipples, and facilities for crushing, washing, and screening coal.

HEAVY FABRICATION INDUSTRIES

Two large heavy fabrication plants, including a heavy equipment plant, and a vehicle plant

are located within the Pao-tou industrial complex. One of the heavy fabrication plants is

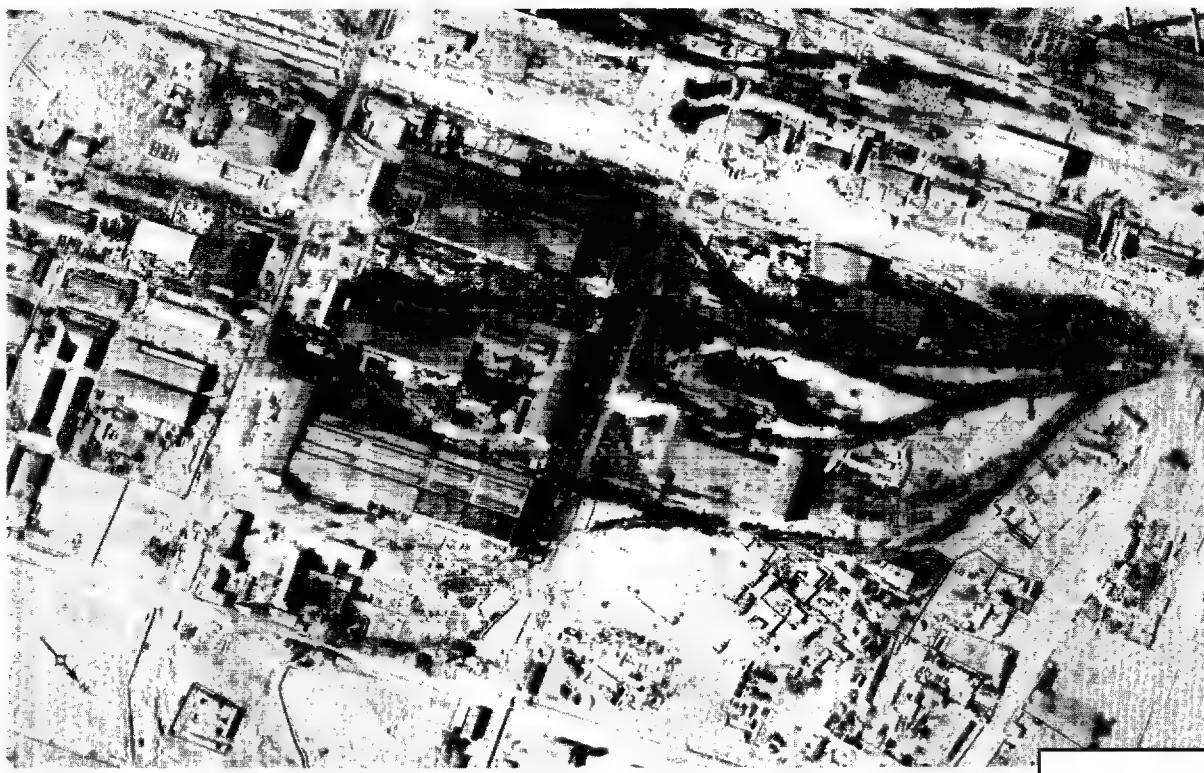


FIGURE 16. HEAVY EQUIPMENT PLANT.

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situated near the coke, iron, and steel combine; the other is along the branch rail line, between the combine and the city of Pao-tou. A vehicle plant is located near the latter heavy fabrication plant and probably operates in conjunction with it. In addition to the vehicle production facilities, there is a large test area.

HEAVY EQUIPMENT PLANT

(40-40N 109-45E)

A heavy equipment plant (Figures 16 and 17) is located 12.5 nm northwest of the reference point. This plant, within the coke, iron, and steel combine, has produced castings, steel beams, and plate used in construction of the combine. The heavy equipment plant appears to have been in operation longer than other plants in the area. Roofs are discolored and the plant area appears cluttered. Cranes, castings, and other objects

in open storage were observed along the rail spurs. Major buildings of the plant include four large machine shops and a probable foundry.

Machine Shop No 1 is I-shaped and has 12 vents evenly spaced on the southern half of its roof. An attached shed (335 by 30 feet) has six vents on its roof possibly for blacksmith forges or annealing furnaces. A probable foundry (325 by 80 feet and 225 by 35 feet) with two tall stacks has discolored roof vents.

A storage yard (1,240 by 90 feet) containing many large castings and served by three overhead traveling cranes extends along the ends of Machine Shops 2, 3, and 4. Machine Shop No 2 has four large circular vents and six small metal stacks on its roof. Two shorter crane-served storage yards are located along either side of this building.

A probable warehouse and a small boiler-

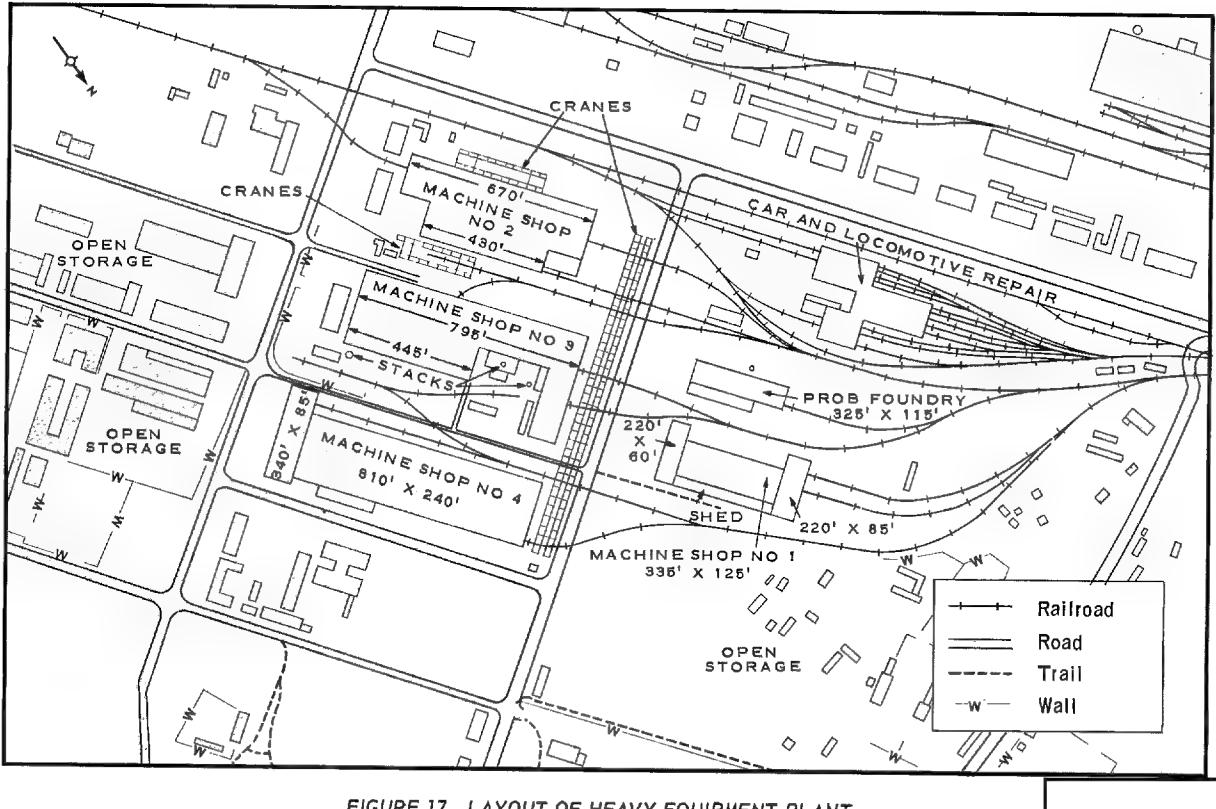


FIGURE 17. LAYOUT OF HEAVY EQUIPMENT PLANT.

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house are attached to Machine Shop No 3. A large ventilator is on the roof of this building. Two stacks were observed, one associated with a probable soaking pit and one probably serving a furnace.

A group of six stacks and a group of four stacks were observed on the east side of the roof of Machine Shop No 4. Nine small storage or utility buildings are also located in the plant area.

HEAVY FABRICATION PLANT

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(40-41N 109-52E; Possibly the Ping-li-she-cheng Armament Plant, [redacted])

A heavy fabrication plant (Figures 18 and 19) is located 10 nm northwest of the reference point. This plant's facilities include foundries, machine shops, a probable erection shop, and final and subassembly shops for the production of heavy steel products such as machinery and locomotives. The plant probably operates in conjunction with the vehicle plant.

The production area of this plant has one large assembly building which is divided into a final assembly section (725 by 195 feet) and a subassembly section (725 by 490 feet). Eleven small stacks on one bay of the subassembly section possibly serve a heat-treating section. The roof of one bay of Machine Shop No 2 is discolored, an indication that this shop probably has a paint section. Machine Shop No 3 has an attached section with eight stacks which probably serve heat-treating furnaces.

An L-shaped probable open-hearth furnace building probably also houses soaking pits and is served by an adjacent tall stack and a crane-served storage yard. A second L-shaped building probably houses rolling mills and soaking pits.

A foundry has one attached section and an adjoining wing. The wing has six exhaust stacks on the roof as indicated by stains. Sand for the foundry is stored nearby. There is also a

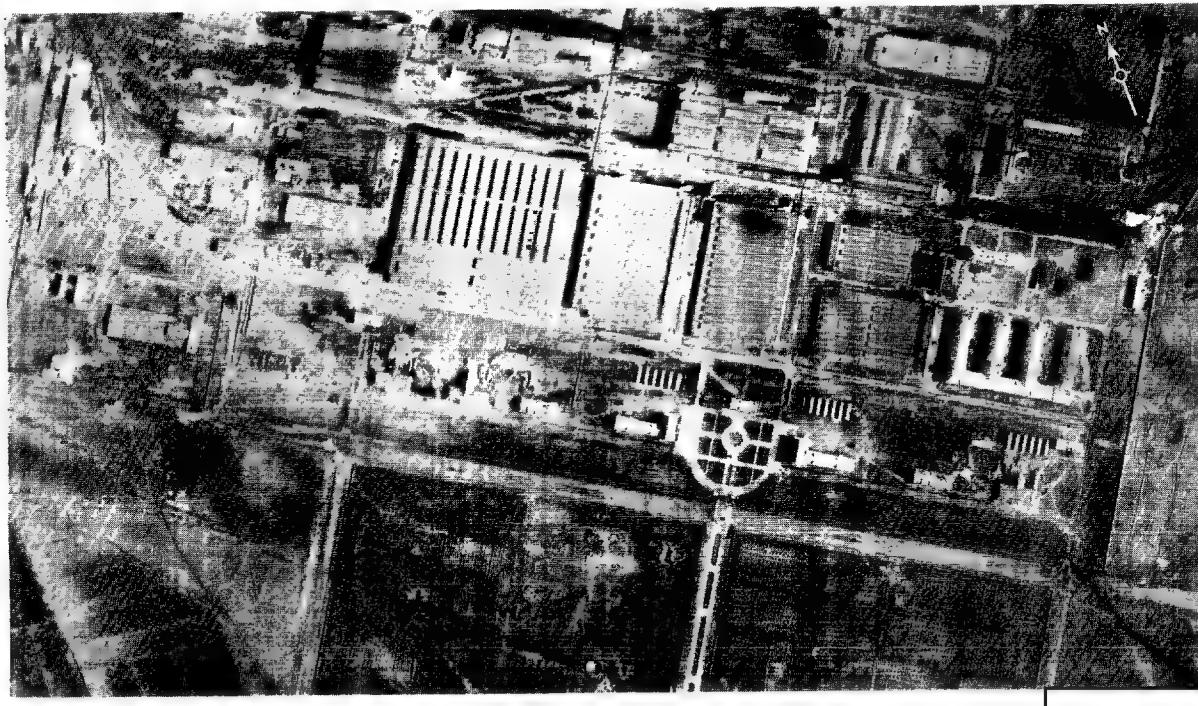


FIGURE 18. HEAVY FABRICATION PLANT.

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probable foundry with a wing. Also within the plant area is a probable locomotive erection shop which has four stalls.

Engineering and design work is accomplished in two buildings; one is a large building with four wings and the other is a small rectangular building.

Within the plant area are two walled sections. One contains a warehouse, five small buildings, and open storage of cylindrical objects. The other area contains a shop, a storage shed, an unidentified building, and several miscellaneous buildings. Several vehicles are parked in this area.

Other less significant facilities, some of which are located beyond the limits of the photo and line drawing, include a foundry, a probable boilerhouse, four warehouses, two square cooling towers, four buried tanks, a pumphouse, and a probable locomotive shed for the industrial complex.

VEHICLE PLANT

(40-39N 109-54E; [REDACTED] Ping-li-she-cheng Tank Plant)

A vehicle plant (Figures 20 and 21) is located 8 nm northwest of the reference point. The plant area is enclosed by a wall. A rail-served assembly building has a final assembly section and a subassembly section.

This plant has ten separate machine shops. Machine Shop No 1 has three furnace stacks on its north side and a large pile of foundry sand nearby. Machine Shop No 3 has 40 short metal stacks probably serving heat treating and annealing furnaces. Sand, rails, and other materials are stored in the open. Machine Shop No 4 has two furnace stacks on its south side, a crane-served storage yard on its west side, and a second crane-served storage yard on the east side which extends along the end of Machine Shop No 5. Many parts are stored in the eastern yard. Three pipes from the steam plant enter

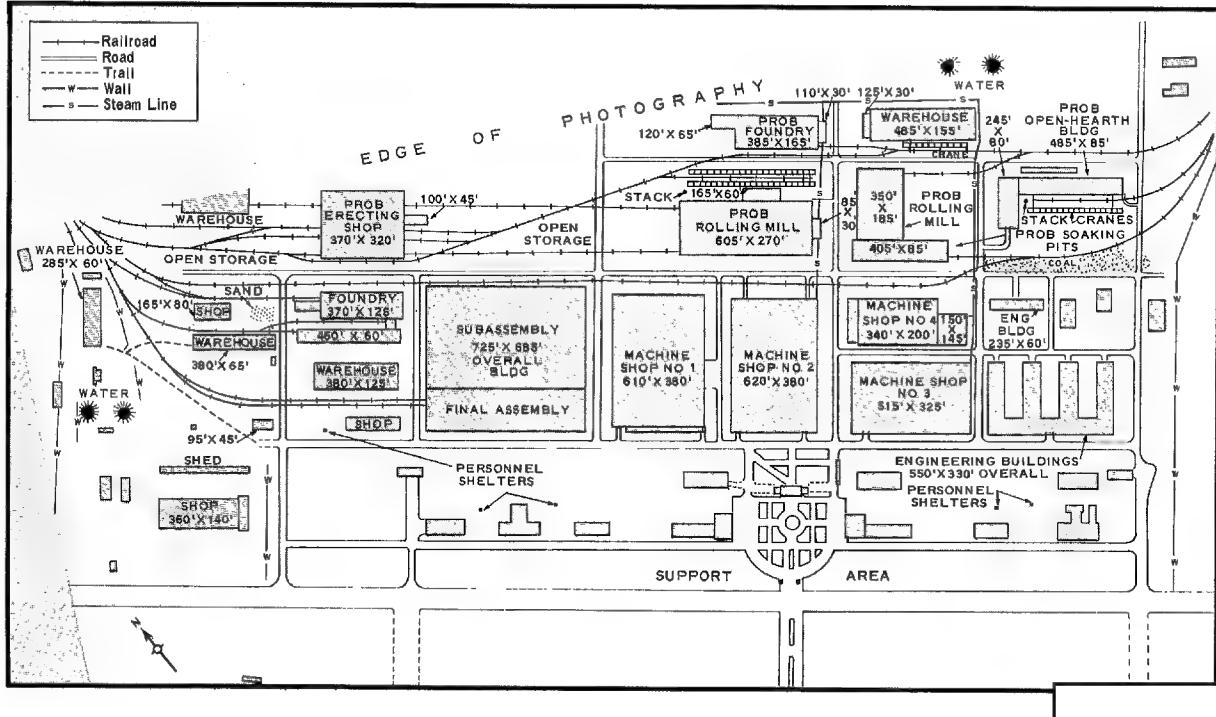


FIGURE 19. LAYOUT OF HEAVY FABRICATION PLANT.

25X1

25X1

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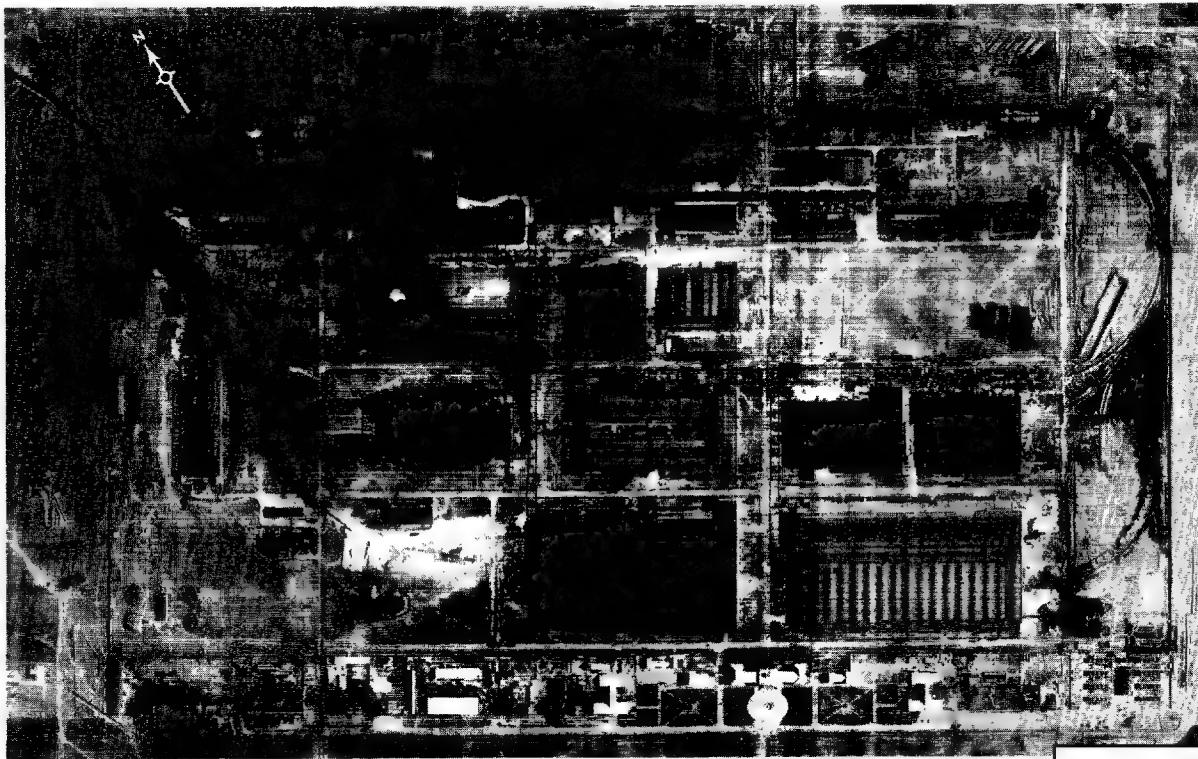


FIGURE 20. VEHICLE PLANT.

25X1

Machine Shop No 5 on the north side.

Located next to each of these pipes is a tall stack emitting faintly visible black smoke. A large area on the roof is discolored. Machine Shop No 8 has three vertical sections, probably for testing the finished products which are stacked along the rail line to the north. A U-shaped probable foundry is served by three tall stacks. A crane-served storage yard is adjacent to this building.

A support area south of the vehicle plant is separated from the plant by a wall or fence. This area contains a multistory administration building, two guard and administration buildings, two H-shaped mess halls, a single administration building, three utility buildings, and two personnel shelters at the rear of the mess halls. Separate residential, storage, and small industrial installations located at the east and west

ends of the support area are probably associated with and dependent upon the vehicle plant, although a wall precludes direct access to the plant.

The type of vehicle produced at this plant is unknown. Although no tracked vehicles were observed, marks of tracked vehicles were visible in the plant area near the firing butt and at a vehicle test facility which is associated with the plant.

VEHICLE TEST FACILITY

(40-42N 109-54E)

A vehicle test facility (Figures 22-24) is located 2.5 nm north of the vehicle plant. This facility consists of two vehicle test tracks, one oval track and one cross-country track, and two support areas, designated Areas A and B. This test facility is associated with the vehicle plant.

25X1

25X1D
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25X1D 25X1D 25X1D

25X1D 25X1D

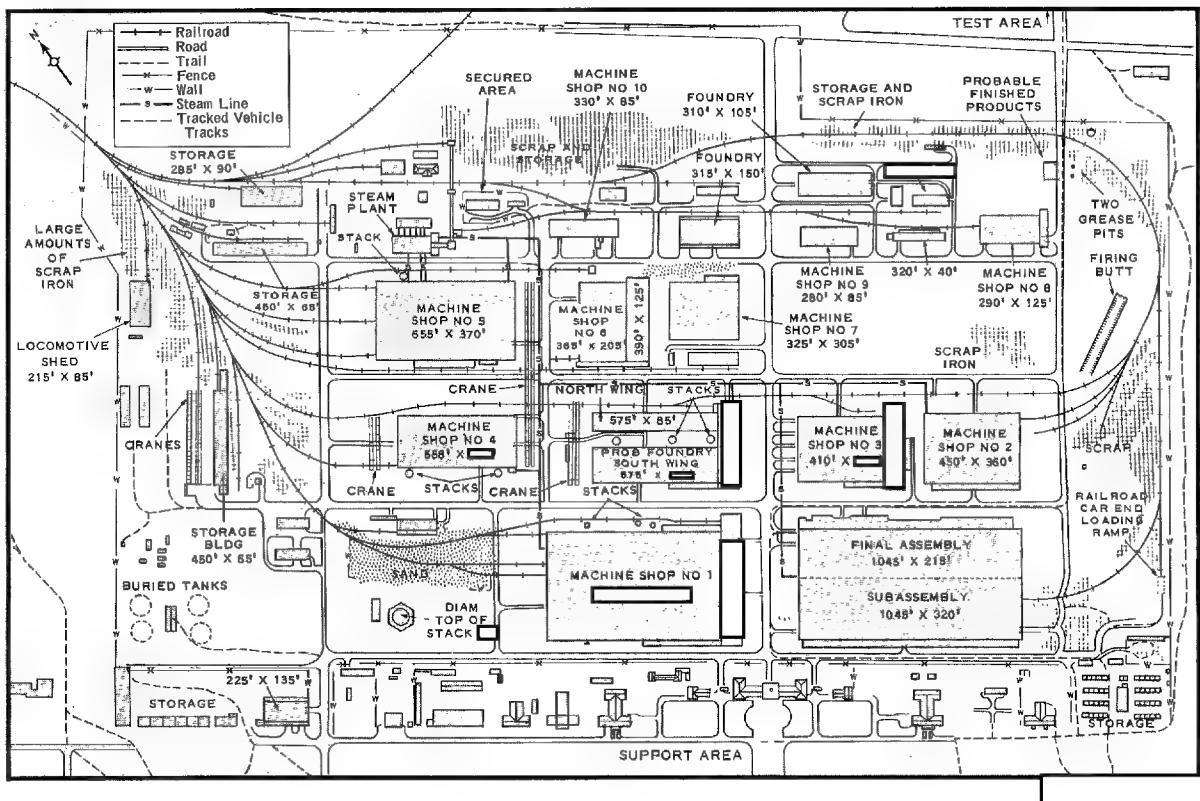


FIGURE 21. LAYOUT OF VEHICLE PLANT.

25X1D

A -foot wide dirt or gravel road connects the vehicle test facilities with the vehicle plant. This is the only access route to the test facilities. The test tracks are suitable for testing both tracked and wheeled vehicles.

25X1D

Oval Track. This track, an elongated oval, has an outside length of 7,010 feet and an inside length of 6,960 feet. The running surface is feet wide, and the surface width, including the shoulder width, measures 25 feet. The eastern portion of the track is still under construction. The completed track will be flat with banked curves, which indicates that it is intended to be used in the testing of wheeled vehicles. The radius of the curves at the junction of the service road and the test track is 150 feet, and the radius of the curve at the junction of the service road and the main road is 160 feet.

Marks of many tracked vehicles are visible northeast of the service road to the oval vehicle test track. Tracks feet in width were made by tracked vehicles. The lack of pattern in these tracks indicates testing activity rather than construction work or training.

Cross-country Track. This track, extending across the foothills, a dry stream bed and open terrain, is located directly north of the oval track. The track is fairly typical of those used in testing tracked vehicles.

Area A. A walled area (Figure 23) is located at the eastern end of the oval track. A hangar-type building within this area is under construction and has three bays. A foot stack is adjacent to this building. Other facilities within the walled area include a storage building, a building under construction, an underground tank prob-

25X1

25X1

25X1

25X1D

25X1

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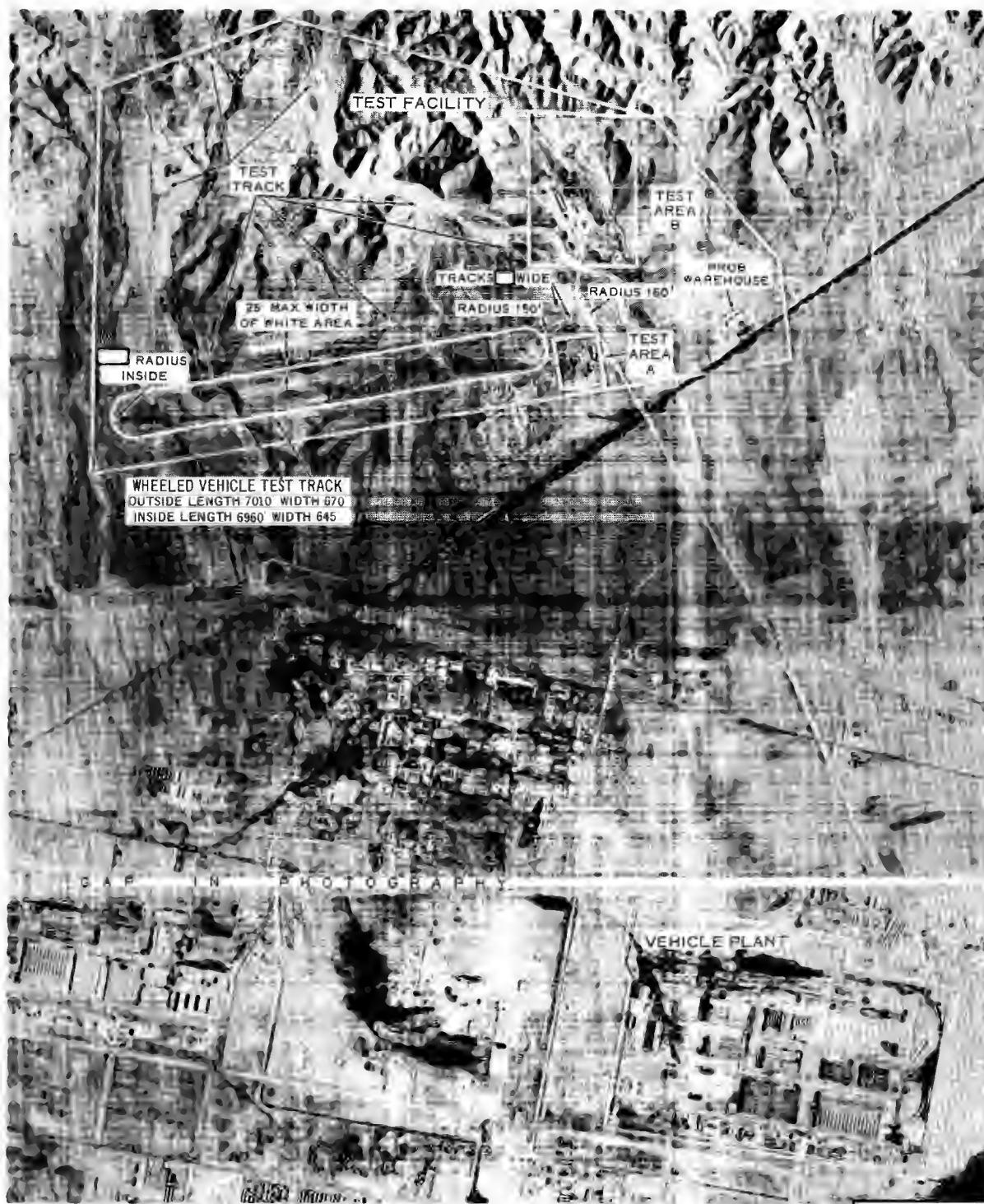


FIGURE 22. MOSAIC OF VEHICLE PLANT AND TEST FACILITY.

25X1

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25X1

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25X1D

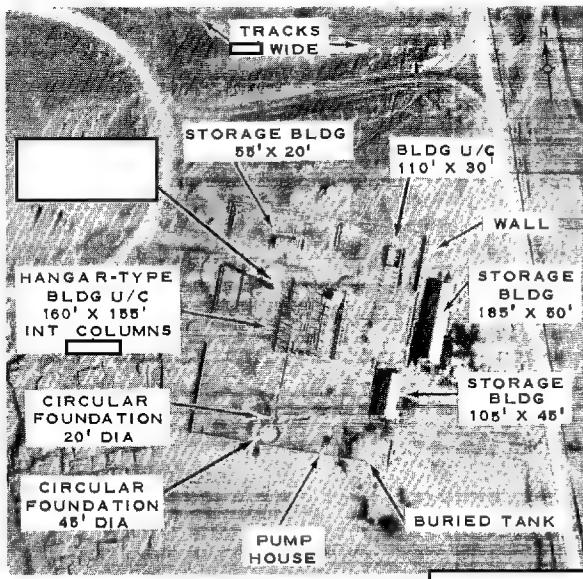


FIGURE 23. TEST AREA A.

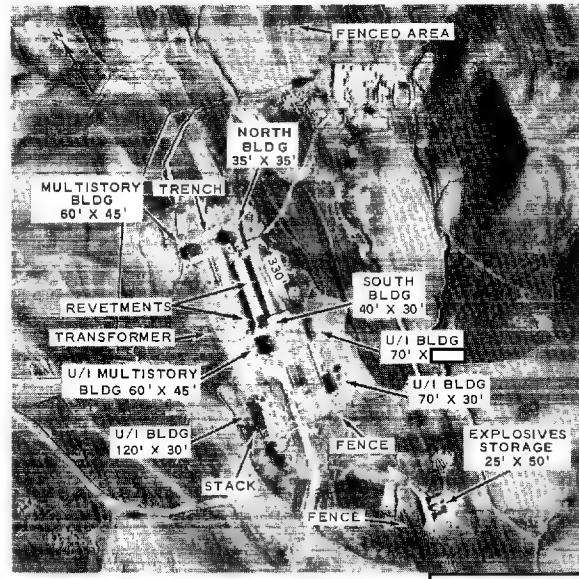


FIGURE 24. TEST AREA B.

25X1
25X1D

ably for water, a small pumphouse, and two circular foundations. Two warehouses are located just outside the wall.

Area B. An area (Figure 24) north of Area A contains two high, parallel earth revetments. The floor between the revetments is feet wide and has a gradual downward slope to the north. A building blocking the north entrance of the revetment is 35 feet square; and a building blocking the south entrance is 40 by 30 feet. The distance between the two buildings is 330 feet. Open trenches for pipelines and other facilities are also visible.

The north building has a low section which appears to be flat roofed, and a high section which is hexagonal. Two light-colored tracks, each feet wide, extend from the tall section, one from the southeastern corner and one from the southwestern corner. Each track slopes upward and follows the top of a revetment to the south building. The two tracks enter the south building on opposite sides. The north building is connected by an open trench to a nearby multistory building (45 by 60 feet).

inside face of the revetment is surfaced, probably with cement, for a distance of 25 feet north from the south building. Such a surface protects the revetment from muzzle blast effect when weapons are fired.

Four unidentified buildings are located in the southern part of this area: one multistory building, two buildings similar in size, and a fourth building (120 by 30 feet) with a stack. The multistory building and the two similar buildings are interconnected by an open trench. Considerable activity and the presence of personnel and many vehicles were observed within the area.

The fact that this facility is still under construction precludes a determination of the final layout or the nature of materials tested. However, several factors, such as the hardened inside surface of the revetments, the adjacent explosives-storage area, the distance (approximately 100 meters) between buildings at the ends of the revetment, and the association with the

25X1

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vehicle plant indicate that the facility may function as an artillery testing range for testing velocity as well as recoil and firing mechanism of weapons prior to their installation in armored vehicles.

North of the revetments is a fenced enclosure containing five small structures, each measuring approximately 5 by 10 feet. South of the revetments is an explosives-storage area,

approximately 325 feet square; it is fenced and contains a single, revetted building. The trail to this installation is extremely poor.

A fenced area (600 by 380 feet), located approximately 3,000 feet east-southeast of the oval track, contains a probable warehouse (285 by 90 feet) and may be associated with the test facilities. The road serving this area is under construction.

MISCELLANEOUS INDUSTRIES

Industries in this section include those which by nature of their production do not fall into one of the major categories of industries discussed in this study.

[redacted], an explosives plant, an aluminum plant, a sugar refinery, a calcium carbide plant, a textile plant, and a large clay

by-products plant.

There are also numerous small industrial plants scattered throughout the Pao-tou complex. Many of these appear to be engaged in home-craft-type production. In many cases it is difficult to determine the product involved. However, many of them appear to be facilities which are

25X9

25X9

25X9

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25X9

very common in China. Therefore, a description of these small plants has not been included in this report.

25X9

EXPLOSIVES PLANT

(40-42N 110-16E)

An explosives plant (Figure 26) is located in the mountains 14 nm northeast of the reference point and one nm northeast of the village of Shih-kuai-tzu. The type of explosives produced at this plant could not be determined; however, it may be industrial or blasting powder used in the nearby coal mines. The plant is only road served and

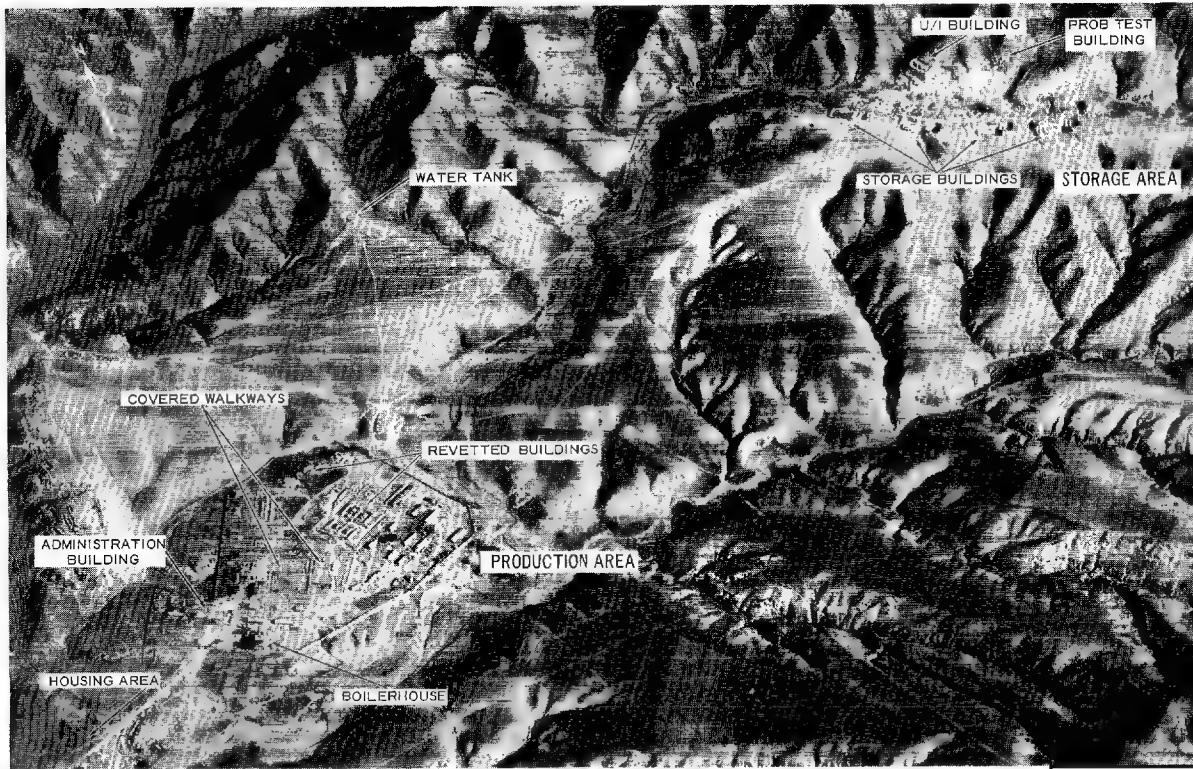


FIGURE 26. EXPLOSIVES PLANT.

25X1

- 21 -

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25X1

25X1

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FIGURE 27. ALUMINUM PLANT.

25X1

- 22 -

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25X1

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all material must be shipped in by truck.

The plant consists of a production and storage area. The production area is secured by a solid wall and guard towers. It contains four large revetted buildings, 15 smaller revetted buildings, an administration building, a boilerhouse, and 21 support and probable production buildings. Covered walkways, a safety feature for manual transportation of explosives, are visible between the processing buildings in the production area. The storage area is secured by a double fence and guard towers. It contains four revetted explosives-storage buildings, a probable test building, and an unidentified revetted building. An associated housing area (not shown) contains 22 barracks-type buildings, a mess hall, and a utility building.

ALUMINUM PLANT

(40-33N 110-08E)

An aluminum plant (Figure 27) is located 6 nm east of the reference point. The plant area (2,300 by 1,300 feet) is secured by a wall; the three road entrances are guarded, and a gate controls access by rail.

Alumina is transported to the plant by rail and then held in the storage section (380 by 75 feet) which is connected by a passageway to the two potrooms (1,325 by 75 feet each). The necessary electrical facilities have been installed: a transformer yard, phase modifiers, a rectifier building (310 by 80 feet), and a control building. A power line serves the transformer yard. Fumes dispersed by the tall stack indicate that the potrooms were in operation at the time of photography. The molten aluminum from the potrooms is cast into ingots in the adjoining well-ventilated casting sections.

A carbon paste section contains open storage of coke and pitch, a large rail-served warehouse (430 by 70 feet), a grinding and blending building (145 by 45 feet), a paste warehouse (475 by 55

feet), and a small boilerhouse. No electrode baking building has been identified; thus, it appears that the aluminum reduction cells are of the Soderberg type, which utilizes carbon paste rather than prebaked electrodes.

The plant possibly produces its own cryolite. [REDACTED]

[REDACTED]. Several of the associated buildings have relatively tall stacks or are well ventilated and may be processing buildings.

Current construction activity indicates that the carbon paste and possible synthetic cryolite sections are being expanded. Sufficient space is available within the walled area for the construction of two additional potrooms and related electrical facilities; however, construction in this area has not progressed enough to permit a definitive analysis.

CALCIUM CARBIDE PLANT

(40-38N 109-44E)

A calcium carbide plant (Figure 28) is located 13.1 nm west-northwest of the reference point. The plant consists of a kiln building (235 by 50 feet) with two vertical kilns complete and space for seven additional kilns; a well-ventilated arc-furnace building (295 by 85 feet) with two sections under construction, one (160 by 85 feet) with vertical steelwork started and the other (600 by 80 feet) where the foundation has been begun. The tall air-liquefaction building appears to be complete. No transformer yard is present; consequently, the arc furnaces cannot be placed in operation even though they may be installed. Other facilities include a rail-served bunker for limestone storage, a conveyor system, two silos for lime storage, a boilerhouse, three warehouses, three unidentified processing buildings, and six other buildings.

When completed, this plant will produce calcium carbide to be used in the production of acetylene for welding in the various industries at

25X1

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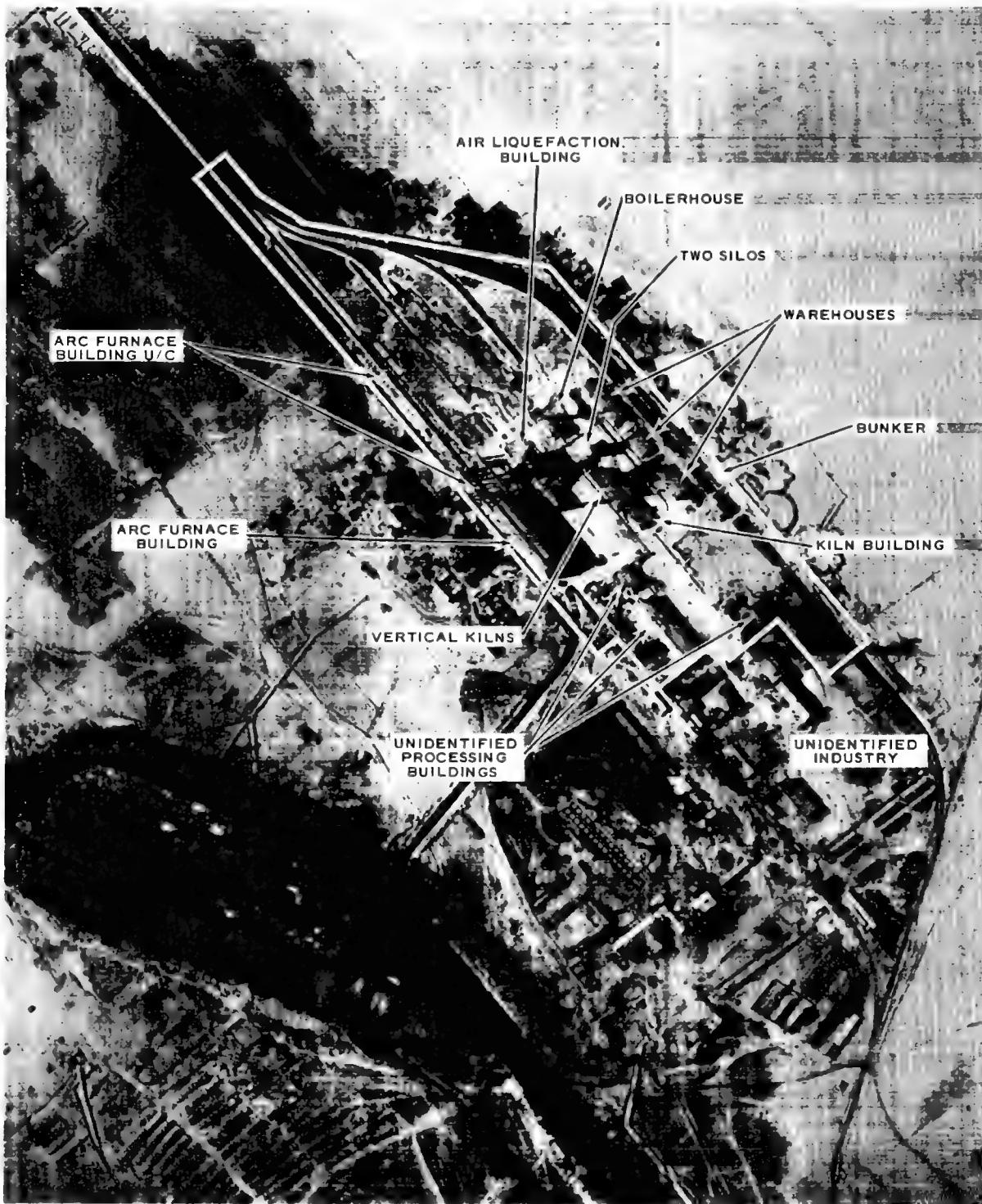


FIGURE 28. CALCIUM CARBIDE PLANT.

25X1

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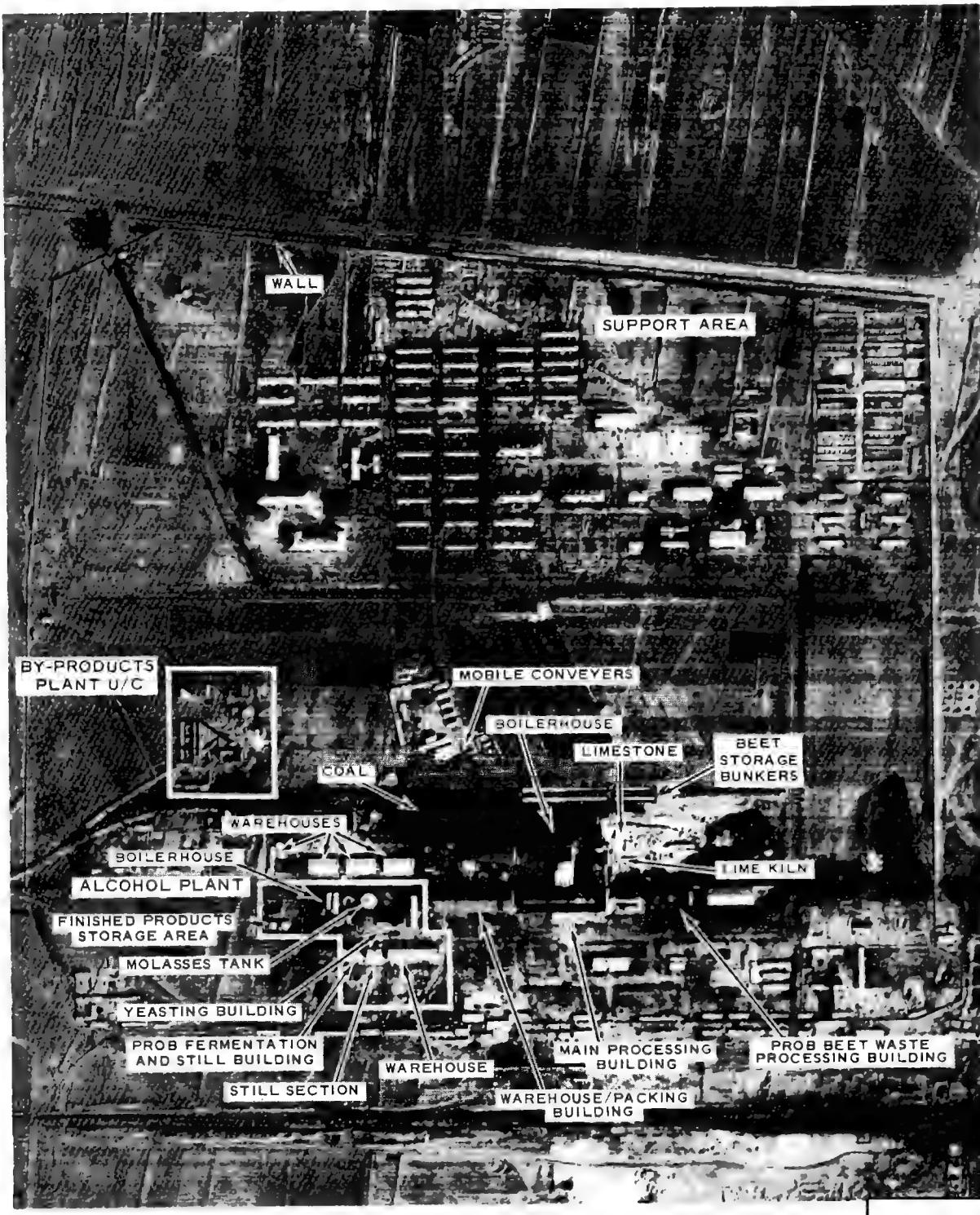


FIGURE 29. SUGAR REFINERY.

25X1

- 25 -

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25X1

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25X1

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Pao-tou. Some of the calcium carbide could be used to produce cyanamide, a nitrogenous fertilizer; however, no cyanamide plant is perceptible on photography.

When the arc furnace building is completed, it will be 1,055 feet long. Such a furnace building would produce calcium carbide far in excess of the requirements of local industries; therefore, it is possible that some related industries may be constructed to utilize it.

25X1A

SUGAR REFINERY

(40-33N 110-11E; [redacted])

The sugar refinery (Figure 29) is located on the north bank of the Huang Ho, approximately 12 nm east of the reference point. A wall-secured area contains the sugar refinery with an associated alcohol plant, an additional by-products plant under construction, and a support area.

The refinery comprises a main processing building (360 by 90 feet); a boilerhouse (145 by 70 feet); a probable beet-waste processing building (160 by 55 feet); a warehouse and packing building (360 by 90 feet); a vertical lime kiln and associated processing building; four beet-storage bunkers; a limestone storage yard; and a coal storage yard. All components are rail served.

The alcohol plant consists of a boilerhouse, a molasses tank, a warehouse, probable fermentation and still sections (in one building), a yeasting building, and a walled area for finished-products storage containing two storage tanks, one small building, and probable drum storage facilities.

The by-products plant under construction consists of at least five buildings. This is not sufficiently advanced to indicate exactly what

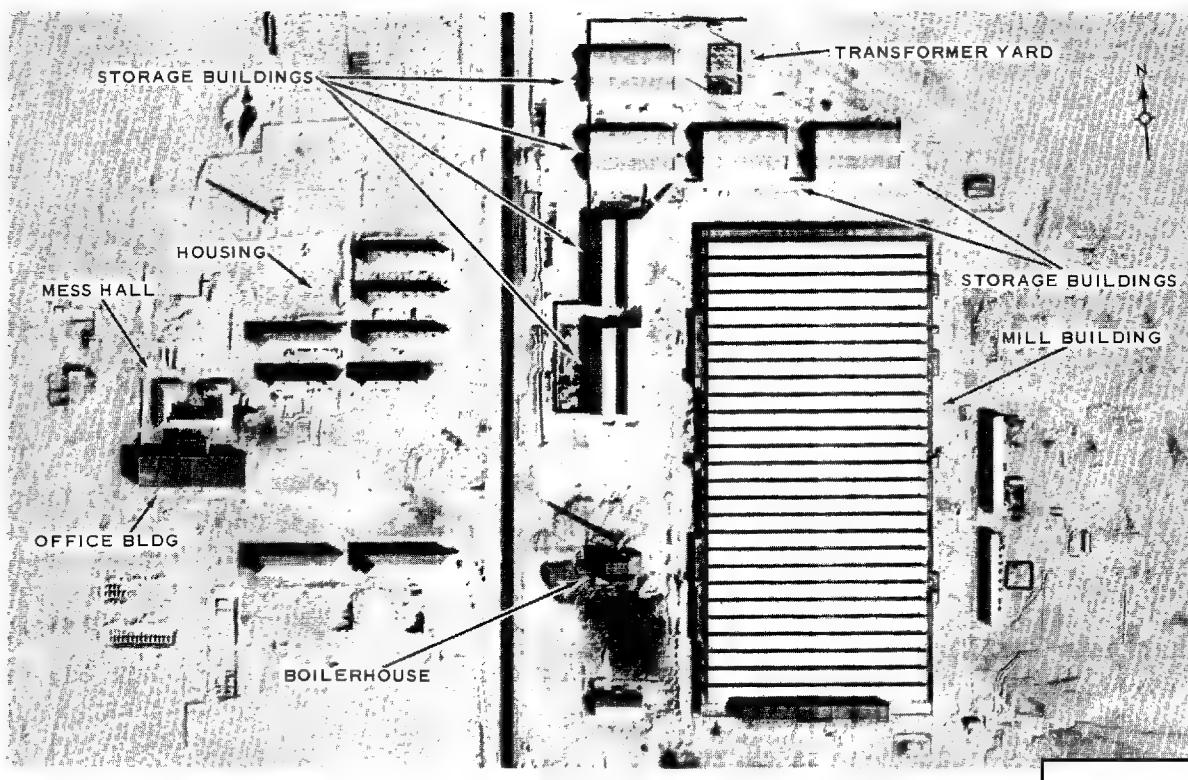


FIGURE 30. TEXTILE MILL.

25X1

25X1

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25X1B

type of plant it will be when completed, but the [redacted]

The support area, located adjacent to the industrial area, contains housing units, mess halls, and boilerhouses. The entire complex is operational and has been in production; however, the plant was idle at the time of photography because of the seasonal unavailability of sugar beets.

TEXTILE MILL
(40-39N 109-51E)

A textile mill (Figure 30) is located 9.1 nm northwest of the reference point. A blacktop highway separates the industrial area of the mill from the administrative and housing area. The industrial area is located east of the highway. It

includes a mill building (1,160 by 550 feet), six storage buildings (each measuring 205 by 120 feet), a small boilerhouse (110 by 50 feet) with one stack, and a transformer yard (120 by 70 feet). An office building, a mess hall, and eight multistory residential buildings are located in the area on the west side of the highway.

CLAY PRODUCTS PLANT

(40-40N 109-45E)

A clay products plant (Figure 31) is located 13.4 nm northwest of the reference point. It is adjacent to Thermal Power Plant No 1 in the coke, iron, and steel combine (Figure 3). This plant produces refractory brick, building brick, and lime.

The various facilities within the plant area are as follows: A tunnel kiln (335 by 120 feet) with an attached shed (320 by 120 feet), a smaller

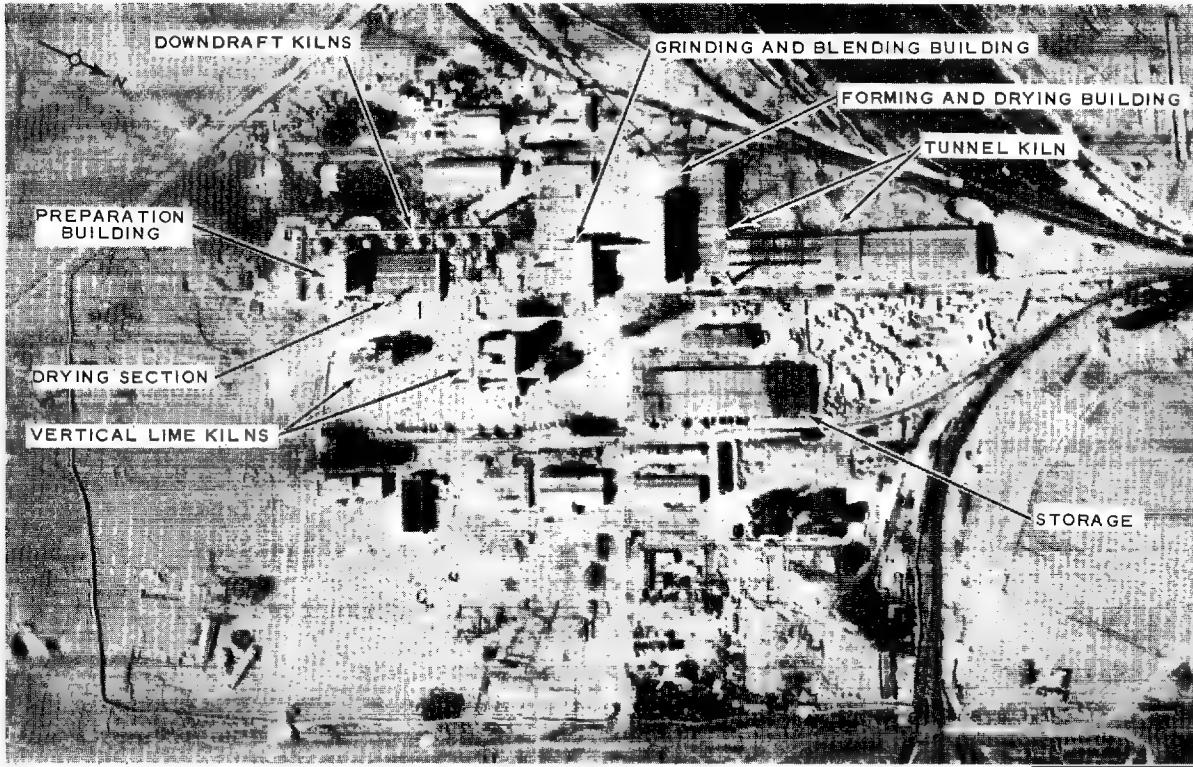


FIGURE 31. CLAY PRODUCTS PLANT.

25X1

25X1

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25X1D

and probably older tunnel kiln (175 by 100 feet), a grinding and blending building (210 by 85 feet) most of which is multistory, a forming and drying building (140 by 65 feet), a storage shed (380 by 140 feet), eight round downdraft kilns (each measuring 35 feet in diameter) for firing refractory brick, four stacks (each of which serves two of the downdraft kilns), a preparation build-

ing for the refractory brick kilns consisting of a multistory structure ([redacted] feet) with a drying section (170 by 100 feet), six vertical lime kilns in a tall structure (175 by 35 feet), and four vertical lime kilns in another structure (100 by 35 feet). Nine storage or utility buildings are also located within the plant area.

POWER PLANTS

25X1A

Three power plants currently supply electrical power and steam to the industrial complex. Power Plant No 1 is new and has adequate space for considerable expansion. Power Plant No 2 is relatively new and, like No 1, is of modern design. Power Plant No 3 is of less modern design and is located in an old section of the complex. Steam from the cooling towers and smoke from the stacks indicate that all three plants were in operation at the time of photography. Coal, which is plentiful in this area, is the fuel used by all three plants.

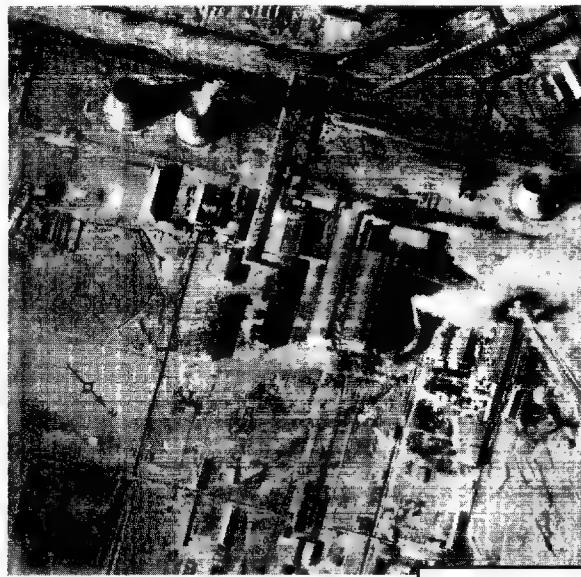


FIGURE 32. THERMAL POWER PLANT NO 1.

25X1

THERMAL POWER PLANT NO 1

(40-39N 109-45E; [redacted] Ping-li-she-cheng Thermal Power Plant)

Thermal Power Plant No 1 (Figures 32 and 33) is located approximately 13 nm northwest of the reference point in the heart of the coke, iron, and steel combine (Figure 3).

The plant consists of a boilerhouse, a generator hall, a switch house, a transformer house, three natural draft cooling towers (155 feet in diameter at the base and 90 feet in diameter at the top), and an open storage area for

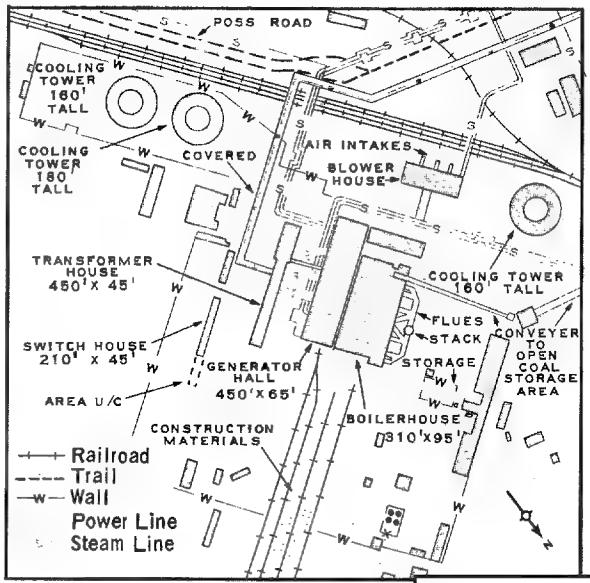


FIGURE 33. LAYOUT OF THERMAL POWER PLANT NO 1.

25X1

25X1

coal. A conveyer, partially underground, connects the coal storage area with the boilerhouse.

Each of the four boilers is connected to the single stack by pairs of flues. A covered power line extends to a central distribution point in the coke, iron, and steel combine, and steam supply lines serve various parts of the surrounding area.

Major construction appeared to be complete, but there were indications that minor expansion is planned. Construction material and equipment are stored in an area adjacent to the plant. Excavations for the footings and foundation of an extension on the switch house are complete, and this extension, if constructed, should increase the size of the switch house by one-third. Provisions have been made for another air intake at the blower house. Despite these indications of planned activity, no actual construction activity was perceptible on [redacted]

25X1D

THERMAL POWER PLANT NO 2

(40-40N 109-58E; [redacted], Pao-tou Thermal Power Plant)

Thermal Power Plant No 2 (Figures 34-36)

25X1A

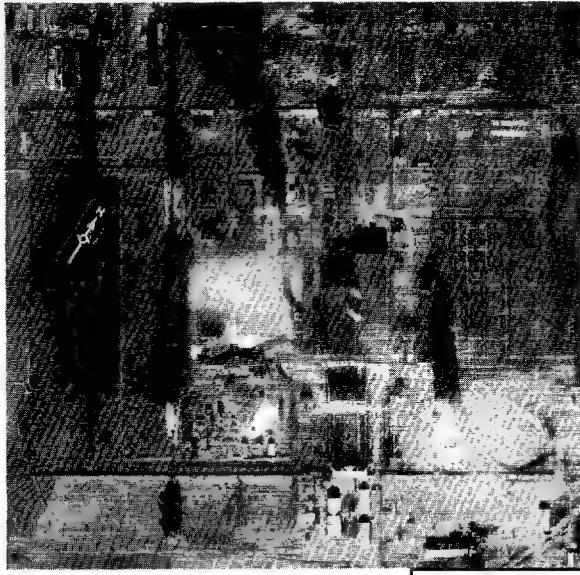


FIGURE 34. THERMAL POWER PLANT NO 2.

is located approximately 11 nm northwest of the reference point.

The plant consists of a boilerhouse, a generator hall, a switch house, a transformer yard, a natural draft cooling tower, a covered coal bunker, and an open storage area for coal. A conveyer, partially underground, connects the coal storage area with the boilerhouse. Several miscellaneous buildings, including one for administration, are visible in the plant area.

The boilerhouse contains three boilers, each of which is connected to the single stack by separate flues. The generator hall contains two generators. Steam lines extend to the nearby heavy fabrication plant and the vehicle plant.

There are indications on the photography of this plant that additional construction is planned. A considerable amount of construction material and equipment is visible on the site. Excavations are complete for a second cooling tower and for an extension of the transformer yard. There is also adequate space within the plant for expansion. The arrangement of the three boilers is such that there is room for another, and there is

25X1D

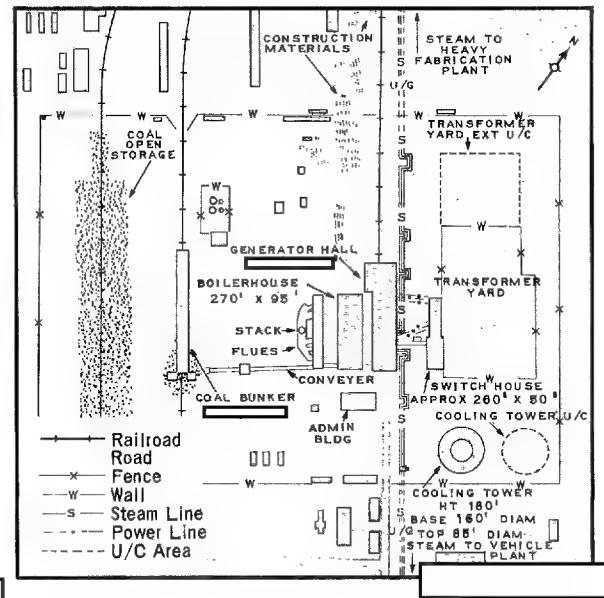


FIGURE 35. LAYOUT OF THERMAL POWER PLANT NO 2.

25X1D

25X1

25X1

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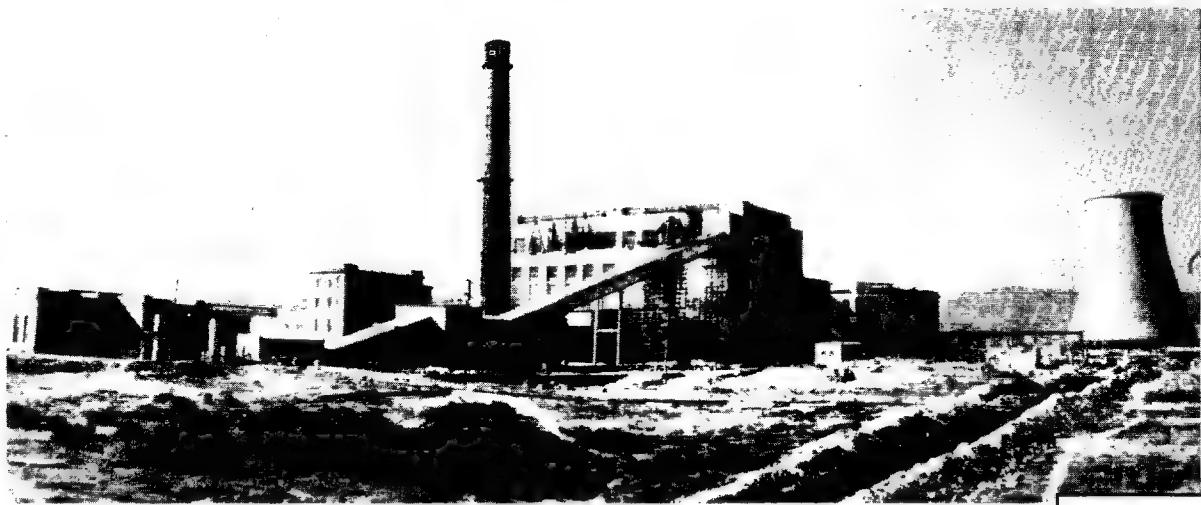


FIGURE 36. GROUND PHOTO OF THERMAL POWER PLANT NO 2.

sufficient space for the installation of more generators, assuming that only two have been installed so far.

25X1A

THERMAL POWER PLANT NO 3

(40-33N 110-01E; [redacted], Pao-tou Thermal Power Plant No 3)

Thermal Power Plant No 3 (Figure 37) is located approximately one nm northeast of the reference point.

This plant consists of a boilerhouse (170 by 110 feet), a generator hall (170 by 80 feet), a transformer yard, a natural draft cooling tower (210 feet tall, 170 feet in diameter at the base and 85 feet in diameter at the top), a water reser-

voir, and a storage area for coal. A conveyer, probably partially underground, connects the coal storage with the boilerhouse. The boilerhouse contains three boilers, each of which is connected to the single stack by a separate flue. One administration building and several miscellaneous buildings are also visible in the plant area.

An old thermal power plant is located south-southwest of Thermal Power Plant No 3. Apparently this old plant was the only source of electrical power for Pao-tou as late as 1945. On [redacted] photography, the old plant is seen to have undergone extensive alterations, and it appears to have been incorporated into a small industry.

25X1

25X1D

TRANSPORTATION FACILITIES

The primary means of transportation serving the Pao-tou industrial complex is the recently completed Ta-tung/Kuei-sui/Pao-tou/Lan-chou railway line. This line passes along the southern edge of the Pao-tou complex in an east-west direction.

An extensive rail network has been developed within the Pao-tou industrial complex. It

permits the transportation of both raw materials and finished products within the complex without use of the main line. The network forms a large loop north of the main line with which it is connected at both the eastern and western extremities of the loop (Figure 43). Railway stations with adjoining yards and shops are located on the main railway line, both at the southeastern

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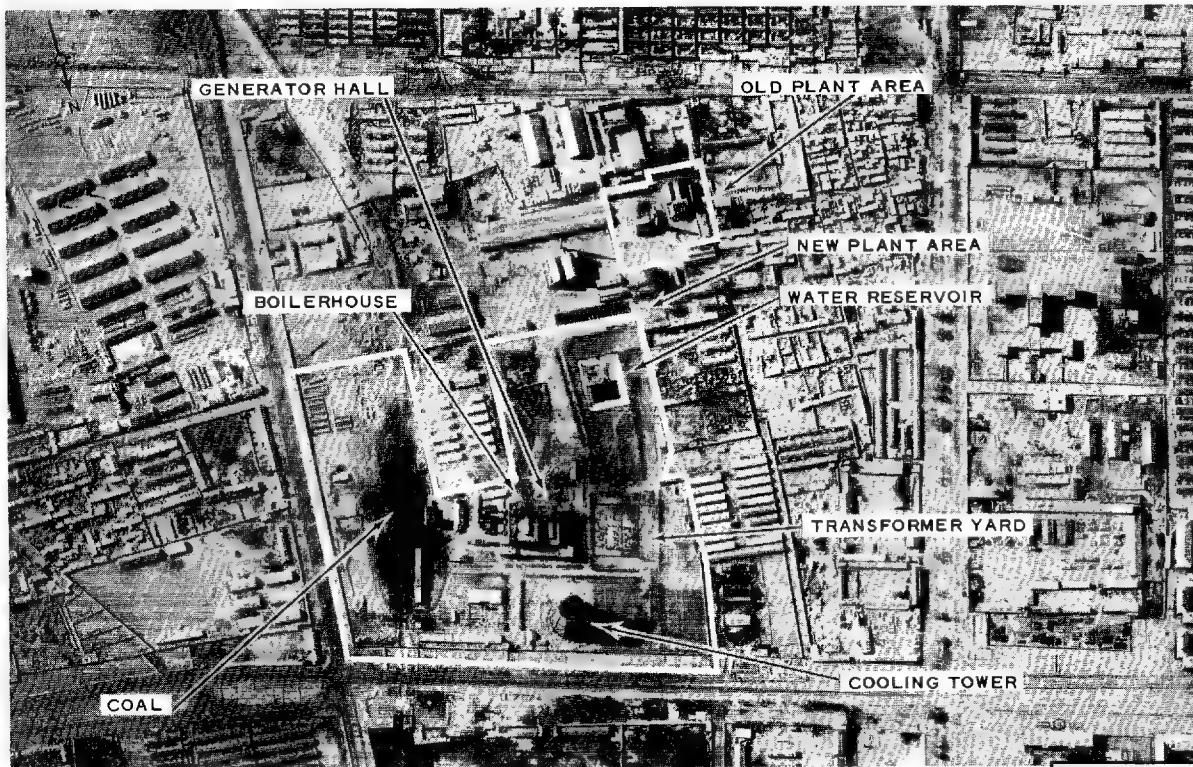


FIGURE 37. THERMAL POWER PLANT NO 3.

25X1

junction of the network in the old city of Pao-tou and at the southwestern junction immediately south of the iron and steel plant area. The loop, which has numerous spurs serving the various industrial installations, connects (from east to west) the possible plutonium production facility, the vehicle plant, the new residential area, the heavy fabrication plant, and the coke, iron, and steel plant area. A branch line which splits off the northeastern side of the loop extends northeast to the coal mines and explosives plant.

The locomotives and rolling stock serving the industrial complex may be manufactured, serviced, and repaired at Pao-tou. Facilities include a classification yard, locomotive repair and servicing shops, car and coach repair shops, and servicing yards. These facilities are also available for equipment used on the main railway line.

The roads within the industrial complex are new and hard surfaced with good alignment and sweeping curves. The blacktop surface, probably tar from the by-products coke plant, has a roadway width of approximately 15 feet; the gravel shoulders are estimated to be less than [redacted] feet wide. Many of the main highways are still under construction. Roads connecting the industrial areas appear to be single lane with provision along the shoulder for off-the-road vehicle passing (Figure 42).

25X1D

PAO-TOU AIRFIELD

(40-34N 110-00E; [redacted])

25X1A

The Pao-tou Airfield (Figure 38) is located immediately south of the city of Pao-tou. The reference point is at the center of the runway in line with the north taxiway.

The single concrete runway measures 5,000

25X1

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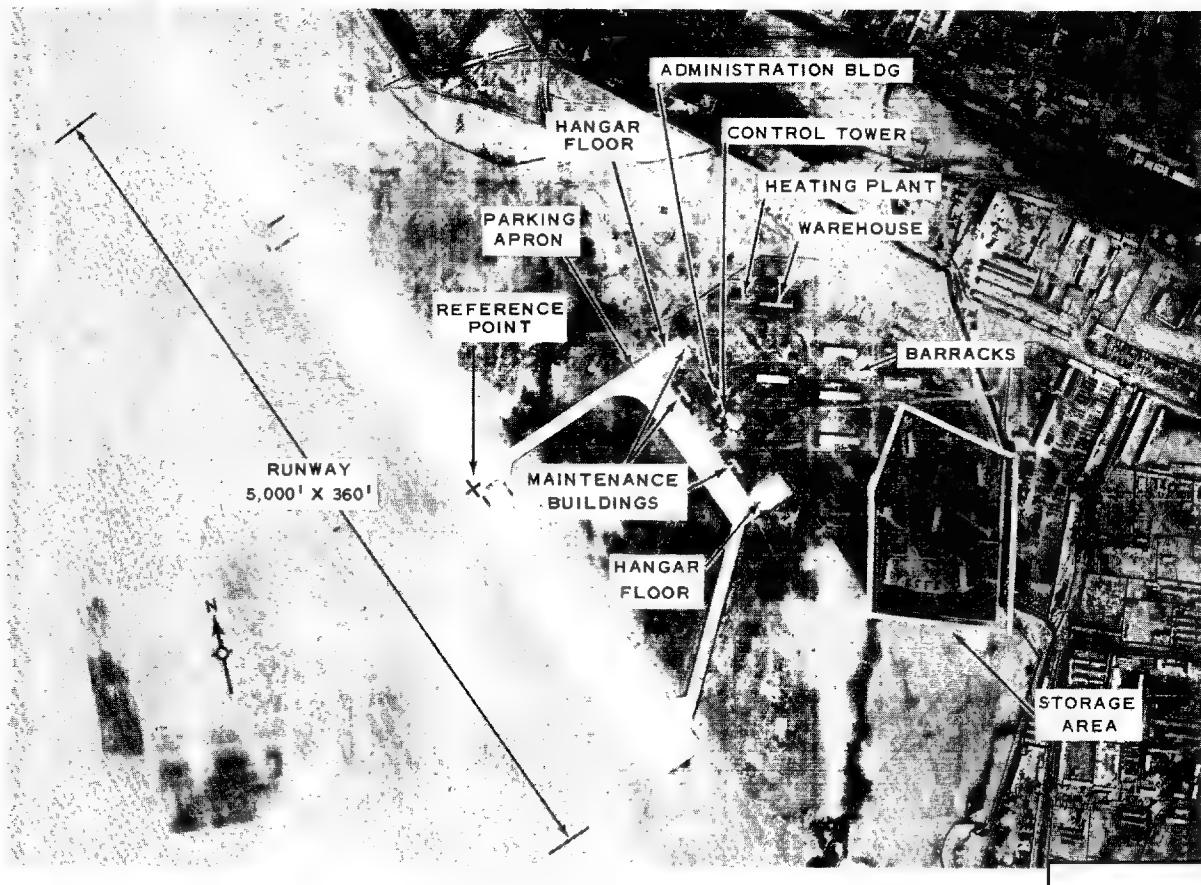


FIGURE 38. PAO-TOU AIRFIELD.

by 360 feet and is oriented in a north-northwest/south-southeast direction; it has an earth overrun of 600 feet on its southeastern end. The load-bearing capacity of the runway is unknown. The physical appearance of the runway, including the patches or markings on its surface, has not changed since 1945. Two taxiways connect the parking apron with the runway. One single-engine liaison-type aircraft was visible on the southern end of the apron at the time of photography [redacted].

Other facilities include five barracks, a mess hall, a communications building with six tall stick masts and approximately six smaller masts around the southernmost barracks, a heating plant, one warehouse, three small air-

craft maintenance buildings, and a fenced explosives-storage area. A control tower is located on the administration building.

Only two changes have occurred at the airfield since 1945. Two hangars, present in 1945, have been destroyed or removed and only the floors remain. Within the explosives-storage area, five small mounded facilities, which appear to be earth-covered POL storage tanks, have been constructed.

25X1

25X1A

PAO-TOU RAILROAD YARDS AND SHOPS

(40-88N 110-00E; [redacted])

The Pao-tou Railroad Yards and Shops (Figure 39) are located in the southern part of Pao-tou, 3,000 feet north of the reference point.

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25X1

This installation contains a passenger station, several yards, and storage and repair facilities.

An eight-track classification yard is 5,660 feet long between choke points. The classification yard is slightly lower than the adjacent holding yard, and cars are classified by means of gravity. No hump is involved in the operation. Four sets of retarders are operated from the small control building.

There are two holding yards: one is an eight-track yard, approximately 5,660 feet long, which is adjacent to the classification yard; and the other is a five-track yard, 2,070 feet long, which is adjacent to the passenger station.

The locomotive repair facilities consist of an eight-stall roundhouse (275 by 95 feet), nine locomotive repair tracks (800 feet long), and a turntable (85 feet in diameter). A turning wye with controlling length of 225 feet, a water tower, and ample reserves of coal and sand are also located in this area.

Other facilities include a passenger station, two freight buildings, one passenger and loading platform, a coal storage yard, two team yards, open storage areas, and several warehouses. The classification yard, the eight-track holding yard, both team yards, the open storage areas, the coal storage yard and the warehouses have been constructed since [redacted]

RAILROAD PASSENGER STATION AND CAR REPAIR PLANT

(40-35N 109-49E, 40-36N 109-48E)

A railroad passenger station and railroad passenger car repair plant (Figure 40) are located 2 nm southeast of the coke, iron, and steel combine. The railroad station is 8.5 nm west-northwest of the reference point. It is a through station serving the new residential areas with which it is connected by a good road.

The station consists of a station building (295 by 60 feet) and a passenger platform (1,040

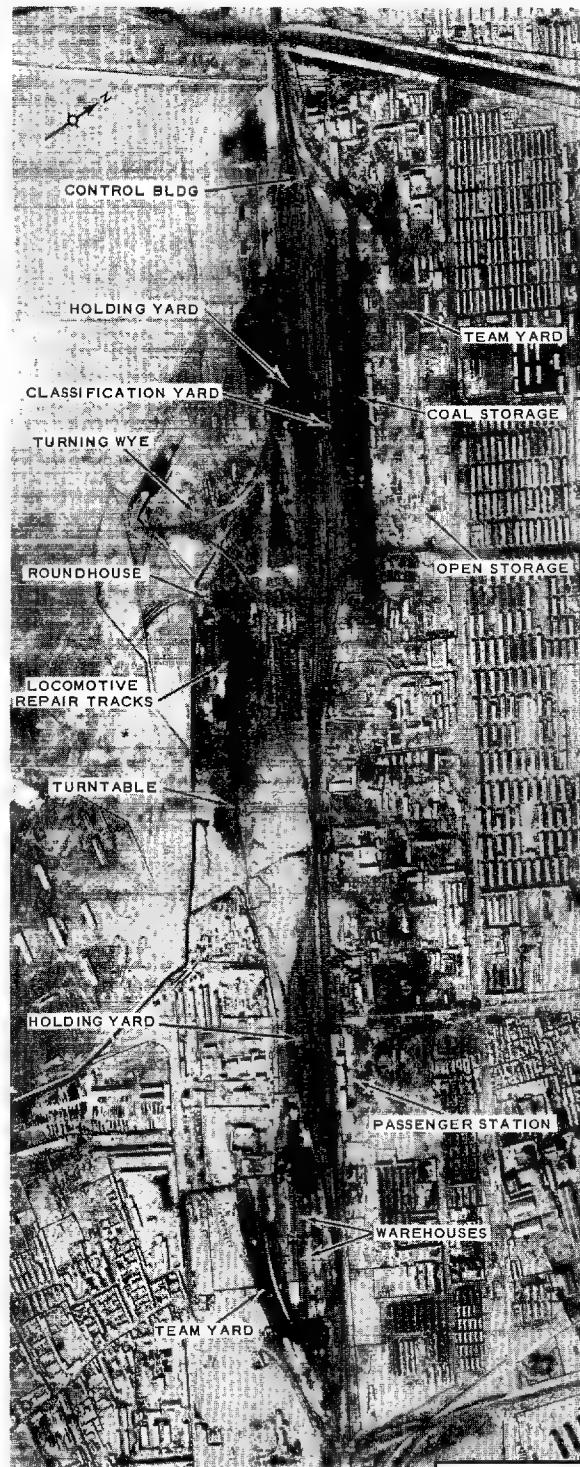


FIGURE 39. PAO-TOU RAILROAD YARDS AND SHOPS.

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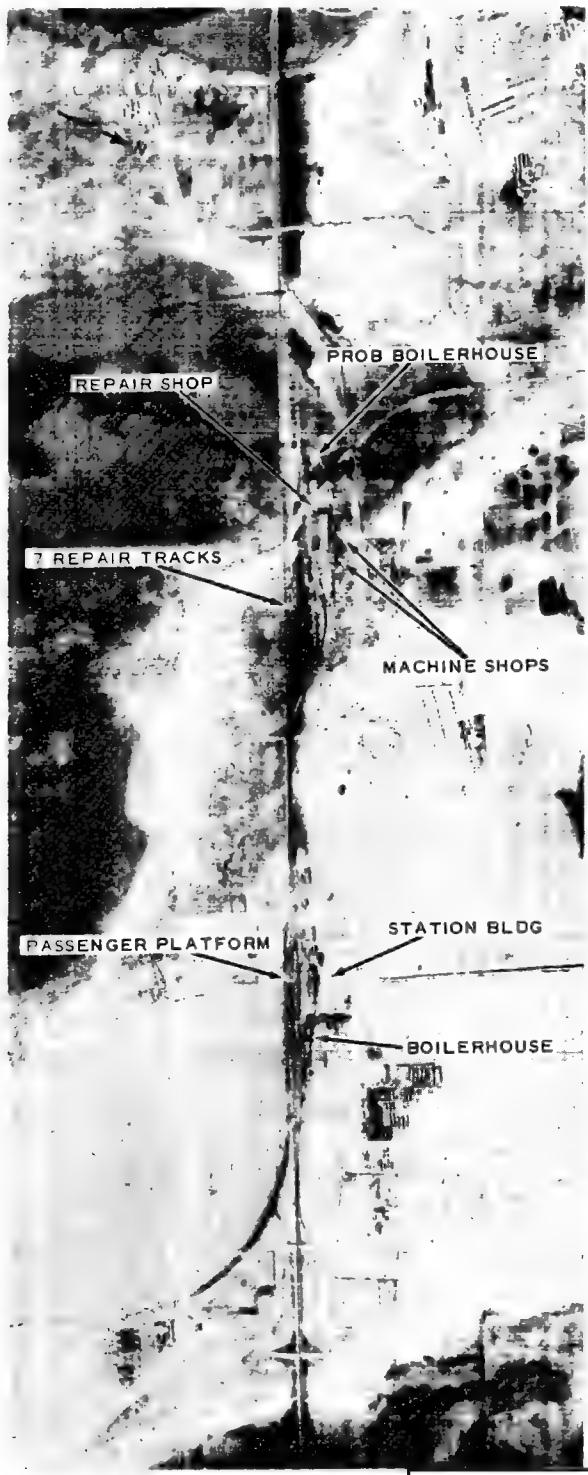


FIGURE 40. RAILROAD PASSENGER STATION AND CAR REPAIR PLANT.



FIGURE 41. RAILROAD YARDS AND SHOPS.

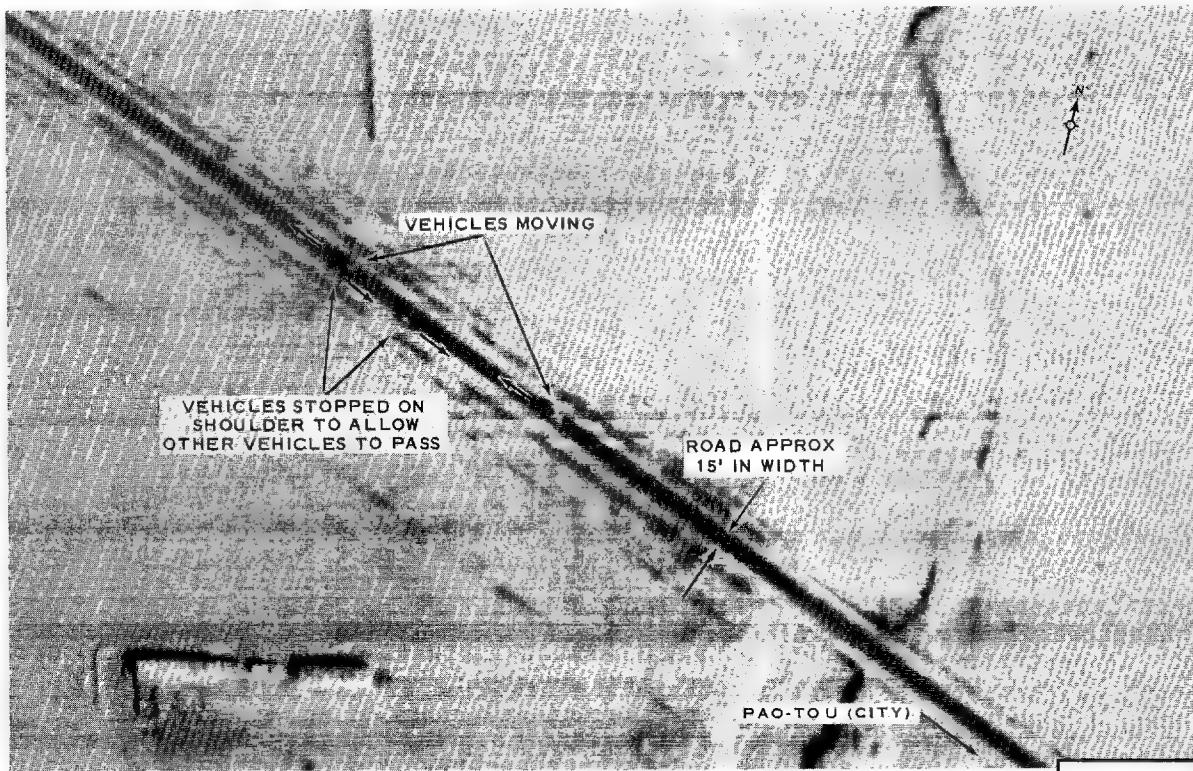
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FIGURE 42. VEHICULAR ACTIVITY OBSERVED ON ROAD WEST OF PAO-TOU.

feet long) at rail level. A small boilerhouse serves the station building and several buildings adjacent to it. The platform is served by two tracks and is separated from the station building by two tracks. Other track facilities include two railroad car-storage tracks (4,000 feet long), one double-end siding (2,800 feet long), and one stub track for freight and coal.

The railroad passenger car repair plant, although under construction, is in operation. When completed it will serve as a maintenance and major repair plant for railroad passenger cars. The plant consists of a repair shop (390 by 185 feet) which is still under construction, two adjoining machine shops (285 by 75 feet and 205 by 60 feet), a probable boilerhouse, and 11 utility buildings. The roof of the repair shop appeared to be about half finished. The building will have six stalls when it is completed. It is served by

three tracks. The plant has seven repair tracks (three are 1,485 feet long, four are 1,385 feet long). Approximately 63 passenger cars were parked on these tracks.

RAILROAD YARDS AND SHOPS

(40-36N 109-43E)

This installation, Railroad Yards and Shops (Figure 41), is located directly south of the coke, iron, and steel combine, and 13.3 nm west-northwest of the reference point. It contains separate repair facilities for locomotives and rail cars, two holding yards, and a classification yard which is under construction.

The locomotive repair facilities include the following: a three-stall locomotive repair and erection shop (180 by 140 feet) adjacent to a probable foundry (255 by 75 feet); a six-stall repair shop (280 by 130 feet); a repair shop under

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construction; a boilerhouse built in two sections, each with a stack; five miscellaneous buildings; one unidentified building under construction; a turning wye with a controlling length of 270 feet; two repair tracks; and storage areas for coal and sand. Approximately 12 locomotives were observed at scattered locations within the installation. The railroad car repair facilities include a four-stall repair shop (300 by 110 feet) with two machine shops (255 by 35 and 215 by 35 feet) adjacent to it; two repair

tracks; a boilerhouse; a water tower; and six utility buildings.

A three-track holding yard, 530 feet long, is located on the southern edge of the locomotive repair section. This yard has a bed for expansion to 10 tracks. A ten-track holding yard, 3,900 feet long, is located adjacent to the railroad car repair facility. A new classification yard (3,645 feet long) with three probable retarder control buildings and a hump is under construction and will probably be 12 tracks wide when completed.

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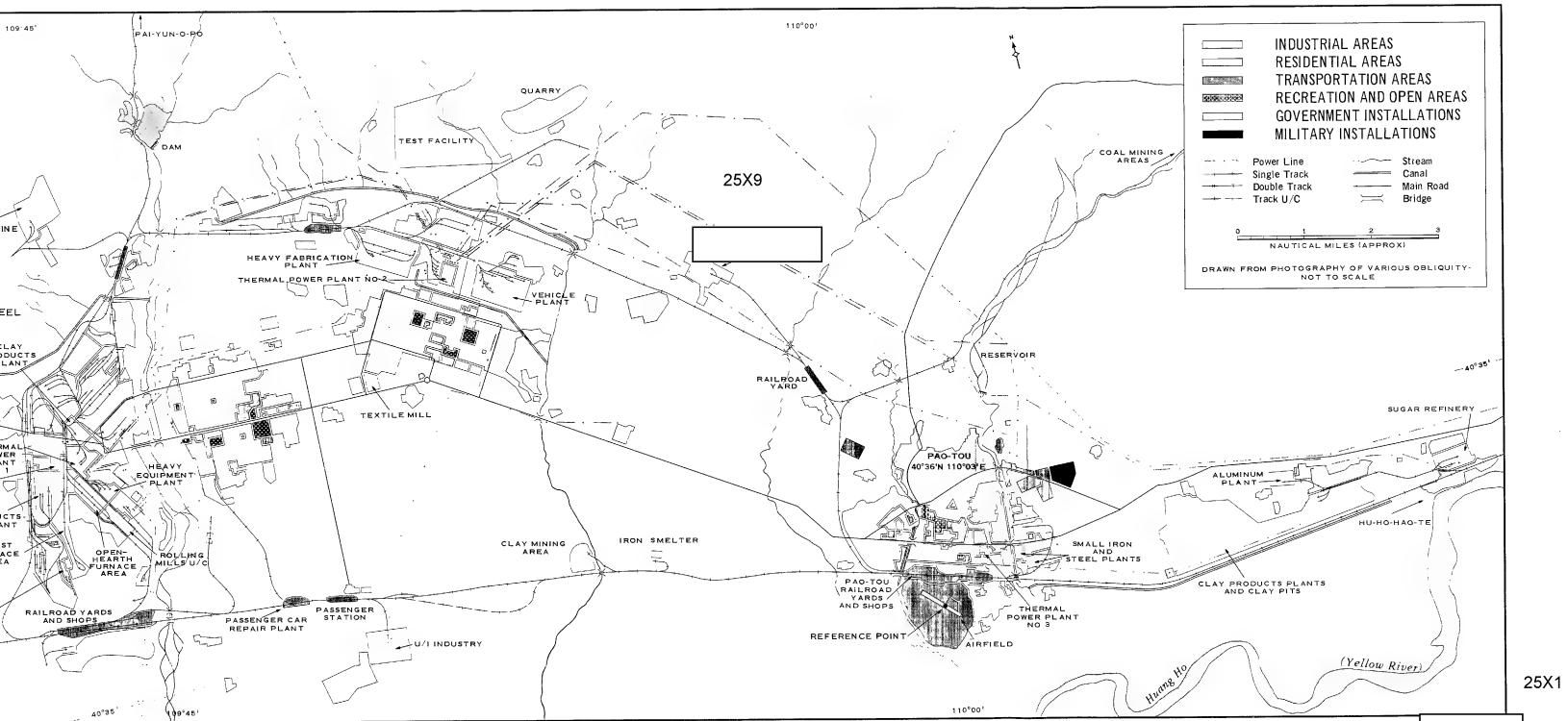


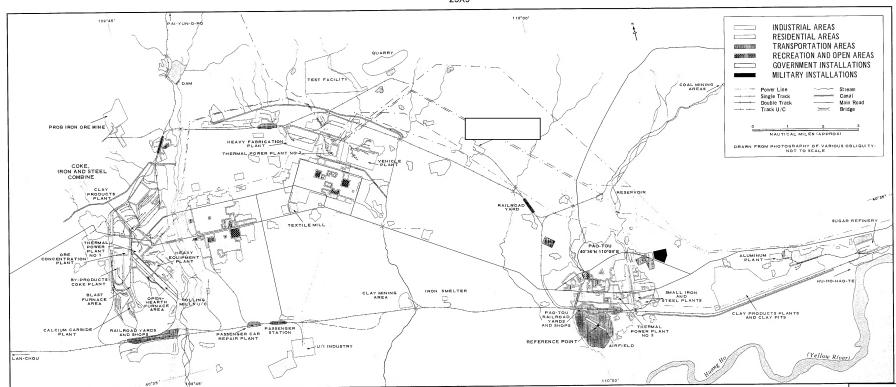
FIGURE 43. LOCATION OF INDUSTRIES IN PAA-TOU INDUSTRIAL COMPLEX.

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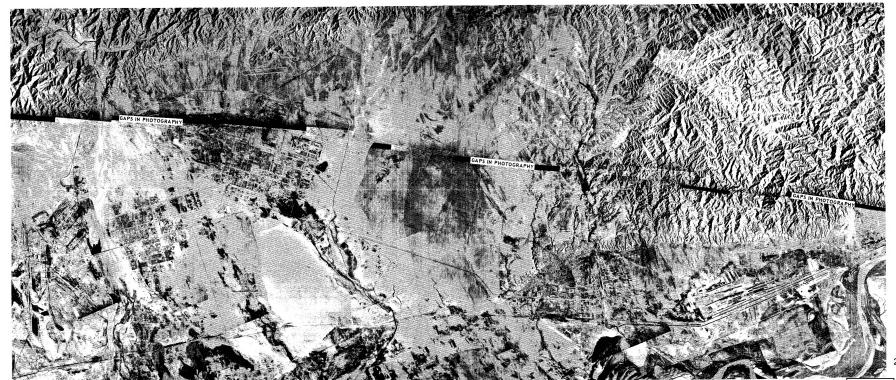


FIGURE 41: MOSAIC OF PHOTOU INDUSTRIAL COMPLEX

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- SAC. US Air Target Chart, Series 200, Sheet 288-18AL, 1st ed, Mar 60, scale 1:200,000 (SECRET)
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REQUIREMENTS

- CIA. DCI/Z-15/63, 5 Apr 63
- ORR/RR-72/63, 9 Apr 63
- ORR/RR-87/63, 15 Apr 63

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